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Some marine nematodes from North Carolina. B. G. CHITWOOD, U. S. Bureau of Animal Industry.

During the summer of 1934, extensive collections of marine nematodes were made by the writer while stationed at the U. S. Bureau of Fisheries Laboratory, Beaufort, N. C. Much of this material has been studied in connection with a revision of the Nematoda now in preparation, and since the majority of the representatives of the genera studied appear to be new, it seems advisable to publish descriptions of these forms. This paper, therefore, contains descriptions of a number of new species belonging to the families Desmodoridae, Axonolaimidae, Comesomidae, Camacolaimidae, Linhomoeidae, Monhysteridae, Siphonolaimidae, Plectidae, and Desmoscolecidae. The representatives of the Desmodoridae have been most completely studied and as a result of this study certain revisions in generic groupings have been made.

The writer is indebted to Dr. G. Steiner, of the Division of Nematology, U. S. Bureau of Plant Industry, for making available the facilities of his office and for much helpful advice and criticism during the course of this work.

Family DESMODORIDAE Steiner, 1927

The family Desmodoridae at the present time contains such a large number of genera that a subdivision seems to be essential. The following grouping of genera is appended both to clarify the placing of new genera and to indicate the writer's views regarding the relationships involved.

1. Desmodorinae Micoletzky, 1924. Amphids spiral, rarely circular; rigid helmet present; dorsal tooth usually present; cuticle not tiled. Genera: *Desmodora, Brachydesmodora, Micromicron, Amphispira, Zalonema, Bolbonema, Croconema, Mastodex, Heterodesmodora, Brachydesmodora, Aculeonchus, Acanthopharynx, Xanthodora,* and *Acanthopharyngoides,* n. g.
2. Stilbonematinae, n. subfam. Amphids minute, slit-like; ? rigid helmet present; dorsal tooth minute or absent; cuticle not tiled or longitudinally broken. Genera: *Stilbonema, Catanema, Leptonemella, Laxonema.*
3. Ceramonematinae Cobb, 1933. Amphids obscurely spiral to shepherd's crook in form; rigid helmet present; dorsal tooth absent; cuticle tiled or longitudinally broken by spined alae. Genera: *Ceramonema, Pselionema, Pristionema* (syn. *Pristinonema*), *Dasynemella* (syn. *Dasynema*), and *Dasynemoides,* n. g.
4. Richtersiinae Cobb, 1933. Amphids spiral or quadrangular; without a rigid helmet; dorsal tooth present or absent; cuticle not tiled, sometimes broken by longitudinal rows of bristles or hooks.

   (a) Richtersiacea Kreis, 1929. Dorsal tooth absent; cuticle bearing longitudinal rows of hooks. Genus: *Richtersia.*

   (b) Metachromadoracea, n. tribe. Dorsal tooth present, very well developed; cuticle sometimes bearing rows of bristles. Genera: *Metachromadora* (syn. *Chromadoropsis, Neonyx, ? Oistolaimus, ? Bradylaimus*), *Chromaspirina* (syn. *Chromaspira, Mesodorus*), *Onyx* (syn. *Sigmophora, ? Oistolaimus, ? Bradylaimus*), *Polysigma* and *Metonyx,* n. g.

   (c) Spirinacea, n. tribe. Dorsal tooth minute or absent; cuticle smooth or nearly so, without rows of bristles. Genera: *Spirina, Laxus,* and *Eubostrichus.*

5. Monoposthiinae Filipjev, 1934. Amphids circular; rigid helmet present or absent; annulation coarse, forming a rigid cephalic region; dorsal tooth present; cuticle not tiled but broken longitudinally by alae bearing spines. Genera: *Monoposthia, Nudora,* and *Rhinema.*

Subfamily Desmodorinae Micoletzky, 1924

Desmodorella cephalata Cobb, 1933

Description.—Cephalic setae 6 on lips, 4 on helmet. Amphids dispiral. Cuticle with annules anastomosing; longitudinal markings or ridges discontinuous, 12 to 20, marked by minute spines (fig. 1, B) becoming setose in postvulvar region. Submedian somatic setae at intervals of about 10 annules. Helmet "etched" (fig. 1, A). Esophagus terminated by an ovoid swelling indistinctly divided into 3 parts. *Female* 880μ long; a, 13.6; β, 6.8; γ, 12; vulva dividing body in proportions of 64:36; anterior ovary extending to within ½ body length from anterior extremity, posterior ovary extending to within 1/5 body length from posterior extremity.

Habitat.—Marine (below low-tide mark).

Locality.—Beaufort, N. C.

Specimens.—U.S.N.M. Helm. Coll. No. 41817.

Heterodesmodora hirsuta, new species

Description.—Cephalic setae 4, opposite level of amphids; subcephalic setae 8, posterior to amphids (fig. 1, C). Amphids multispiral. Cuticle coarsely annulated and bearing 10 longitudinal rows of minute bristles (fig. 1, D). Stoma unarmed; esophagus terminated by a small swelling. *Female* 133 mm long; a, 20; β, 11; γ, 14.4; vulva dividing body in proportions of 62:38. Ovaries extending to within 1/2.5 and 1/3 body length from respective extremities.

Habitat.—Marine (sand flats and depth of 20 feet).

Locality.—Beaufort and Shackelford's Banks, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41818.

Heterodesmodora hirsuta differs from *H. ditlevseni* (Mic., 1922) in that the 8 subcephalic setae are anterior to the amphids in that species, and from *H. pilosa* (Ditlevsen, 1926) in that the cephalic setae are anterior to the amphids in that species.

Acanthopharyngoides, new genus

Diagnosis.—Desmodorinae: Helmet well developed, elongated, and clearly jointed (fig. 1, E). Cuticle finely striated, striae not broken longitudinally. Cephalic setae 4 (dl. and vl.). Amphids obscurely spiral (fig. 1, E). Stoma cylindrical, containing a large dorsal tooth and 2 sub-ventral teeth, ventral wall of stoma double at base (fig. 1, E); esophagus cylindrical, enlarged in posterior part. *Male* with a medioventral row of papilloid supplementary organs.

Type species.—*Acanthopharyngoides scleratum,* n. sp.

The genus *Acanthopharyngoides* appears to be most closely related to *Xanthodora, Aculeonchus, Acanthopharynx,* and *Brachydesmodora* in that the esophagus is cylindrical or terminated by an elongated swelling; it differs from all of these genera in the cuticular duplication at the base of the stoma, the jointed form of the helmet, and from all of them except *Brachydesmodora* in the arrangement of cephalic setae.

Acanthopharyngoides scleratum, new species

Description.—*Male* 2.31 to 2.64 mm long; a, 62 to 69; β, 7.3 to 8; γ, 31 to 47. Spicules arcuate, cephalated, gubernaculum proximally hooked; 13 to 14 preanal supplementary organs present. *Female* unknown.

Habitat.—Marine (sand banks and depth of about 50 feet).

Locality.—Near Shackleford's Banks, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41819.

Subfamily CERAMONEMATINAE Cobb, 1933

Ceramonema reticulatum, new species

Description.—Cephalic setae consisting of 2 circles, an anterior circle of 6 (dd., el., and vv.) and a posterior circle of 4 (ld. and lv.); 4 sublateral pore-like spots opposite level of amphids (fig. 1, H). Amphids open spiral verging towards shepherd's crook in form, crook nearly as long as staff. Cuticle tiled, tiles containing groups of granules; annules approximately 160 in number; cuticle longitudinally grooved (fig. 1, I). *Male* 1.12 mm long; a, 52; β, 8; γ, 6.7. Spicules short and thick; gubernaculum present. *Female* unknown.

Habitat.—Marine (sand flats).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41820.

Ceramonema sculpturatum, new species

Description.—Similar to *C. reticulatum* but with more simple cuticular tiles (fig. 1, K) and not containing granules. *Adults* unknown. *Larva* 1.46 mm long; a, 70; β, ?; γ, 8.7.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41821.

Both of the foregoing species of *Ceramonema* differ from *C. attenuatum* Cobb, 1920, in that the crook of the amphids is nearly as long as the staff, while in that species the staff is much longer. All three of the species differ in the form of the tiling.

Pselionema annulatum var. *beauforti*, new variety

Description.—Cephalic setae 4, straight, well developed. Amphids shepherd's crook in form. Cuticle with rather flat, wide tiles (fig. 1, L & M); number of annules approximately 100. *Male* 650μ long; a, 35; β, ?; γ, 6. *Female* unknown.

Habitat.—Marine (below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41822.

Pselionema annulatum var. *beauforti* is extremely close to *P. annulatum*, differing but slightly in form of tiling (fig. 1, L) and relative size of the amphids.

Pselionema rigidum, new species

Description.—Cephalic setae 4, straight, well developed, Amphids open spiral in form. Cuticle with angulate or curved tiles (fig. 1, Q), depending on body region; number of annules approximately 110. *Male* unknown. *Female* 640μ long; a, 23; β, ?; γ, 5.6; vulva dividing body in proportions 50:50.

Habitat.—Marine (below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41823.

Pselionema rigidum differs from *P. hexalatum* in the form of the cephalic setae (fig. 1, P); it may be differentiated from *P. annulatum* by the form of the amphids and the tiling.

Pselionema hexalatum, new species

Description.—Cephalic setae consisting of a single circle of 4 minute bent setae (ld. and lv.) (fig. 1, N). Amphids open spiral in form. Cuticle with angulate tiles (fig. 1, O), number of tiles approximately 86. *Male* unknown. *Female* 602μ long; a, 21; β, 4.7; γ, 6; vulva dividing body in proportions 50:50.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41824.

Pselionema hexalatum differs from *P. annulatum* (Filipjev, 1922), n. comb. (syn. *Steineria annulata* Filipjev, 1922) in the form of the tilings, the minute setae, and the shape of the amphids.

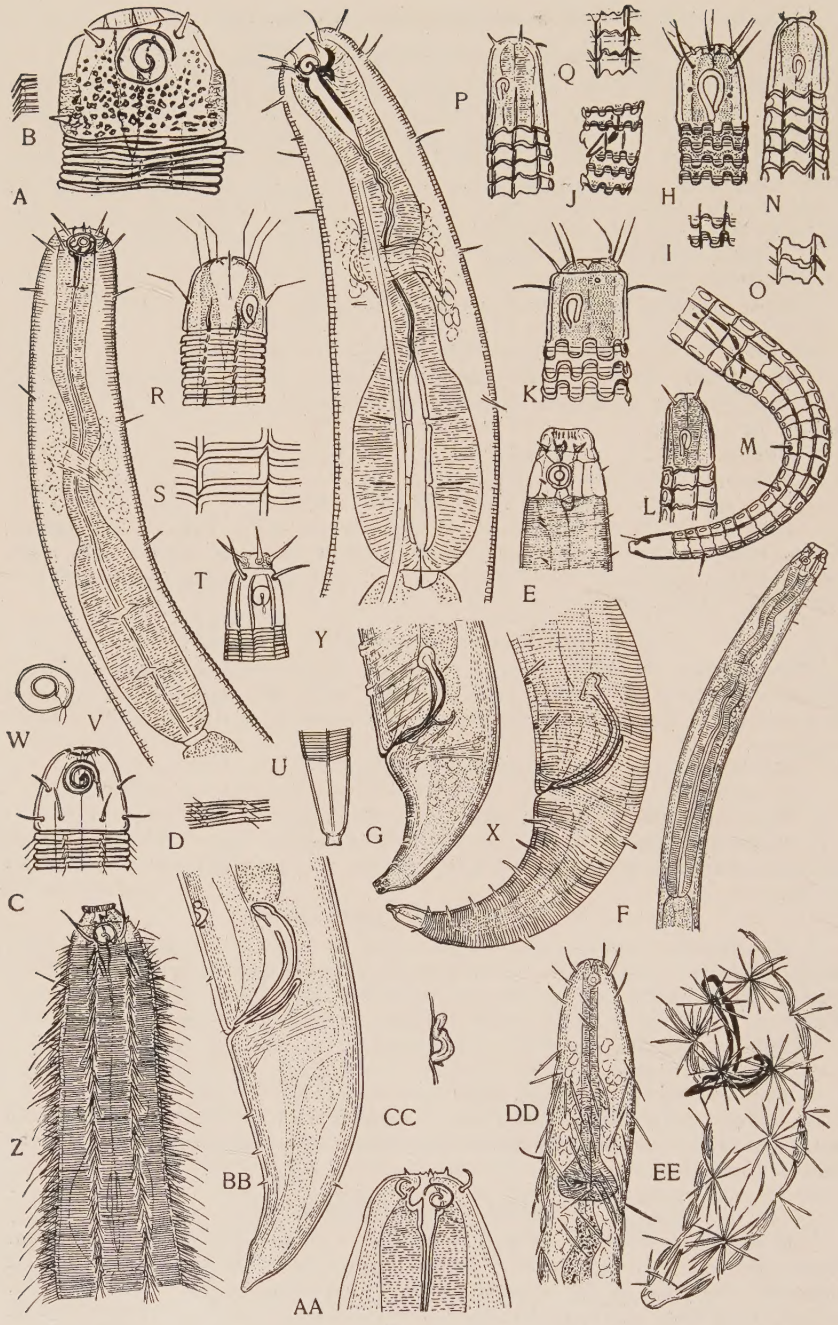

Fig. 1

A-B—*Desmodorella cephalata* (B—Edge of body in mid-region showing spines). C-D—*Heterodesmodora hirsuta*. E-G—*Acanthopharyngoides scleratum*. H-J—*Ceramonema reticulatum*. K—*C. sculpturatum*. L-M—*Pselionema annulatum* var. *beauforti*. N-O—*P. hexalatum*. P-Q—*P. rigidum*. R-S—*Dasynemella phalangida*. T-U—*Dasynemoides setosum*. V-X—*Metachromadora onyxoides* (W—Amphid). Y—*M. obesa*. Z—*Metonyx horridus*. AA-CC—*Polysigma uniforme* (CC—Supplementary organ). DD-EE—*Eubostrichus parasitifera*.

Dasynemella phalangida, new species

Description.—Cephalic setae consisting of an anterior circle of 6 setae (dd., el. and vv.) and a posterior circle of 4 setae (ld. and lv.), setae approximately 2/3 as long as head width (fig. 1, R). Amphids unispiral. Cuticle coarsely annulate, about 380 annules; annules broken by longitudinal markings (fig. 1, S). Lips 3, indistinct; stoma wide, unarmed, surrounded by esophageal tissue. Esophagus cylindrical, lining thick. *Male* unknown. *Female* 1.58 mm long; a, 61; β, 8.6; γ, 11; vulva dividing body in proportions of 60:40.

Habitat.—Marine (sandy bottom, depth of 20 feet).

Locality.—Off Shackleford's Banks, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41825.

Dasynemella phalangida differs from *D. sexalineata* (Cobb, 1920), n. comb. (syn. *Dasynema sexalineatum* Cobb, 1920) in that the cephalic setae are less than 1/5 as long as the head width in that species, while they are 2/3 as long as the head width in the present species.

Dasynemoides, new genus

Diagnosis.—Ceramonematinae: Helmet longitudinally ridged; 10 longitudinal ridges on body; labial region distinct from helmet (fig. 1, T); cephalic setae thick, 10 in 2 circles, anterior circle of 6 (dd., el., and vv.) and posterior circle of 4 (ld. and lv.). Amphids unispiral. Cuticle coarsely annulated and ridged (fig. 1, U); annules spine-like at ridges. Stoma unarmed; esophagus terminated by a slight glandular swelling. *Female* with 2 reflexed ovaries.

Type species.—*Dasynemoides setosum*, n. sp.

Dasynemoides setosum, new species

Description.—*Male* unknown. *Female* 1.48 mm long; a, 45; β, 11; γ, 14.5; vulva dividing body in proportions of 55:45; ovaries reflexed, extending to within 3/8 and 1/3.2 body length from anterior and posterior extremities, respectively.

Habitat.—Marine (depths of 15 and 50 feet).

Locality.—Shackleford's Channel, and off Point Lookout, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41826.

Dasynemoides appears to be most closely related to *Dasynemella* Cobb, 1933; it differs from that genus in the form of the helmet, the cephalic setae, and the labial region (fig. 1, T).

Subfamily Richtersiinae Cobb, 1933

Tribe Metachromadoracea, new tribe

Metachromadora onyxoides, new species

Description.—Oral opening hexalobed, eversible, bearing internal circle of 6 papillae; external circle consisting of 6 short setae (dd., el., and vv.) and 4 long setae (ld. and lv.); subcephalic setae present, somewhat variable (fig. 1, V); submedian somatic setae present. Amphids obscurely spiral (fig. 1, W). Alae absent. Esophagus terminated by an elongated swelling divided into 3 regions. *Male* 1.19 to 1.45 mm long; a, 43 to 45; β, 6.1 to 6.7; γ, 14 to 15.7. Testis extending to within 1/3 to 1/4 body length from anterior extremity. Subventral setae present; supplementary organs 9 to 10, placed on a very slight medioventral elevation. *Female* 1.54 to 1.73 mm long; a, 27 to 37; β, 6.9 to 7.1; γ, 18 to 18.7; vulva dividing body in proportions of 52:48 to 61:39. Ovaries reflexed, extending to within 2/3 to 1/3 and 1/5 body length from anterior and posterior extremities, respectively. Oviparous; egg 74μ long by 41μ wide; 4 to 5 pairs of subventral setae in vulvar region.

Habitat.—Marine (beach below low-tide mark and sand flats).

Locality.—Beaufort, Shackleford's Banks, and Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41827.

Metachromadora obesa, new species

Description—Similar to *M. onyxoides* except amphids distinctly spiral and lateral alae present (fig. 1, Y). *Male* 880μ to 900μ long; a, 16 to 24; β, 5.6 to 6.3; γ, 8 to 10; subventral setae present; supplementary organs 8, placed on a conspicuously raised medioventral elevation. *Female* 900μ to 1.1 mm long; a, 9.5 to 11.5; β, 4.6 to 5.4; γ, 12 to 13. Vulva dividing body in proportions of 53:47 to 65:35; ovaries reflexed, extending to within 1/3 and 1/6 body length from anterior and posterior extremities, respectively. Heavy coat of minute setae in subventral vulvar region extending anteriorly and posteriorly but less marked.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41828.

The genus *Metachromadora* contains several species which may be distinguished from the above forms as follows: *M. vivipara* (de Man, 1907) has a double esophageal bulb; *M. cancellata* (Cobb, 1933), n. comb., has 8 longitudinal rows of 5 setae in the cephalic region; *M. cystoseirae* Filipjev, 1918, has a thickened cuticle around the amphids; *M. macroutera* Filipjev, 1918, has short blunt cephalic setae; *M. alata* (Cobb, 1933), n. comb. and *M. campycoma* (Cobb, 1933), n. comb., are similar to *M. obesa* and differ from *M. onyxoides* in the presence of lateral alae. *M. obesa* may be differentiated from *M. campycoma* by its relative obesity. *M. alata* must be considered a *species inquirenda* since the description is inadequate.

Metonyx, new genus

Diagnosis.—Richtersiinae; Metachromadoracea: Cuticle striated nearly to head, without a rigid helmet. Somatic setae in 10 rows, composed of 2 types, large bristles and small bristles (fig. 1, Z). Cephalic setae 6 short, conoid (dd., el., and vv.) and 4 long, attentuated (ld. and lv.). Amphids unispiral. Stoma containing a large dorsal tooth and 2 subventral teeth; esophagus terminated by a double bulb. *Male* unknown. *Female* with 2 reflexed ovaries.

Type species.—*Metonyx horridus,* n. sp.

Metonyx horridus, new species

Description.—*Male* unknown. *Female* 770μ long; a, 171; β, 6.2; γ, 9.6; vulva dividing body in proportions of 67:33; ovaries reflexed, extending to within 1/2 and 1/6 body length from corresponding extremities.

Habitat.—Marine (sand bar).

Locality.—Off Shackleford's Banks, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41829.

The genus *Metonyx* appears to be most closely related to *Metachromadora* Filipjev, 1918, but differs from that genus in the presence of a very heavy coat of bristles.

Polysigma uniforme Cobb, 1920

Description.—Oral opening surrounded by 6 minute papillae of internal circle; external circle consisting of 6 conoid papillae and 4 setae (fig. 1, AA). Amphids unispiral, thin walled. Cuticle smooth. Esophagus terminated by an ovoid swelling; nerve ring approximately 1/2 length of esophagus from anterior extremity. *Male* 2.0 to 2.1 mm long; a, 40 to 50; β, 10 to 15; γ, 20.9 to 32. Supplementary organs (fig. 1, BB & CC) variable in number (totals of 40 and 60 counted), extending about 1/2 length of body.

Habitat.—Marine (beach, below low-tide mark, and sand banks).

Locality.—Beaufort and near Shackleford's Banks, N. C.

Specimen.—U.S.N.M. Helm. Coll. No. 41831.

The great variability in numbers of supplementary organs appears to be a growth phenomenon, and in this case their numbers cannot be considered as specific.

Tribe Spirinacea, new tribe

Eubostrichus parasitiferus, new species

Description.—Cephalic setae 4 (ld. and lv.); somatic setae in sublateral irregular rows (fig. 1, DD). Amphids obscurely spiral. Cuticle nearly smooth; minute striations. Stoma unarmed, rudimentary. *Male* 2.8 to 2.92 mm long; a, 75 to 100; β, 31 to 33; γ, 26 to 30. Spicules arcuate; gubernaculum proximally hooked. *Female* 2.8 mm long; a, 75; β, 30; γ, 30; vulva dividing body in proportions of 43:67; ovaries ? reflexed, extending to within 1/3.3 and 1/2.3 body length from anterior and posterior extremities, respectively.

Habitat.—Marine (depth of about 15 feet, and beach below low-tide mark).

Locality.—Shackleford's Channel and Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41830.

Eubostrichus was originally described by Greeff (1869, Arch. Naturg. 35: 47-48) as being coarsely annulated. This appearance is due to the presence of spores of fungi (fig. 1, EE). In the case of *E. filiformis*, the anterior and posterior extremities were reversed in the original illustrations. The present species differs from both *E. filiformis* Greeff, 1869, and *E. phalacrus* Greeff, 1869, in that it is much smaller, being less than 3 mm long as against 8 mm in Greeff's species.

Tribe Richtersiacea Kreis, 1929

Richtersia beauforti, new species

Description.—Collar apparently absent, cephalic region drawn into stoma, multiridged; cephalic setae not observed clearly (fig. 2, A & B). Cuticle with only about 20 to 30 longitudinal rows of hooks, particularly marked in preanal region (fig. 2, C). Stoma cylindrical, unarmed; esophagus cylindrical. *Male* 705μ long; a, 9; β, 3; γ, 10.2. Spicules arcuate; gubernaculum simple.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41832.

Richtersia beauforti differs from *R. collaris* Steiner, 1916, in that there are fewer longitudinal rows of hooks, there being 50 to 60 rows in *R. collaris; R. beauforti* may be distinguished from *R. tenuis* Kreis, 1929, and *R. demani* Stekhoven, 1935, in that the stoma is elongated and cylindrical in the former species, whereas it is wide and infundibuliform in the latter species.

Subfamily Monoposthiinae Filipjev, 1934

Monoposthia hexalata, new species

Description.—Oral opening surrounded by 6 small lips bearing internal circle of papillae; external circle consisting of 6 conoid papillae (dd., el., and vv.) and 4 long setae (ld. and lv.). Amphids interrupting first and second annules (often deeper in second annule than illustrated in fig. 2, E). Cuticle bearing 6 longitudinal ridges. Second annule not enlarged. Ridges reversed near base of esophagus. Sublateral somatic setae present. *Male* 1.1 mm long; a, 23; β, 6; γ, 13.7. Ventral annulation anterior to anus raised in 2 regions (fig. 2, H) between which there is a depressed area. *Female* 870μ to 1.0 mm long; a, 15.7 to 18; β, 5.2 to 5.8; γ, 13.5 to 17; vulva dividing body in proportions of 86:14 to 90:10; ovary extending to within 1/3 body length from anterior extremity.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41833.

Monoposthia hexalata differs from the majority of the species of this genus in having only 6 longitudinal ridges. It differs from *M. mirabilis* Schulz, 1932, and *M. mielcki* Steiner, 1916, in that the second annule is much wider than the other annules in those species, while such is not the case in *M. hexalata.*

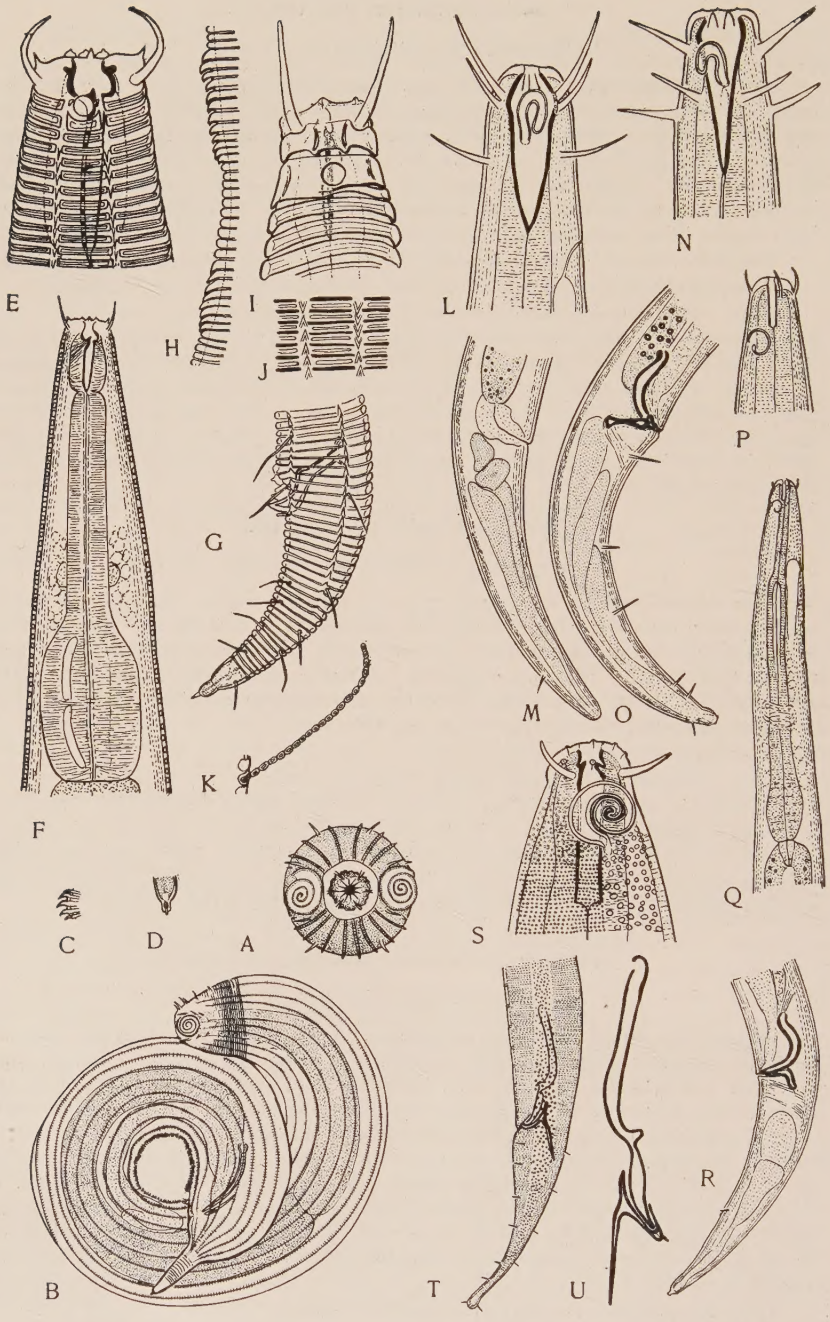

FIG. 2

A-D—*Richtersia beauforti* (C—Hooks on ventral side in preanal region). E-H—*Monoposthia hexalata*. I-K—*M. duodecimalata* (K—Spores of parasitic fungus, *Oidium* sp., projecting through the cuticle; the same type of fungus also commonly parasitizes *Metachromadora* spp.). L-M—*Axonolaimus subsimilis*. N-O—*A. odontophoroides*. P-R—*Araeolaimus* (*Araeolaimus*) *cylindrolaimus*. S-U—*Dorylaimopsis metatypicus*.

Monoposthia duodecimalata, new species

Description.—Oral opening and cephalic setae as in *M. hexalata.* Amphids within second annule (fig. 2, I); second annule enlarged. Cuticle bearing 12 longitudinal ridges. Ridges reversed near middle of body (fig. 2, J). Sublateral somatic setae present. *Male* 1.17 mm long; a, 36; β, 8.4; γ, 10.6. Ventral annulation not modified; spicule as in *M. hexalata. Female* 990μ to 1.06 mm long; a, 26 to 29; β, 6.5 to 7.6; γ, 19; vulva dividing body in proportions 90:10; ovary extending to within about 1/3 body length from anterior extremity.

Habitat.—Marine (beach, below tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41834.

Monoposthia duodecimalata differs from all other species of the genus which have more than 6 alae in that the second annule is definitely enlarged.

Family AXONOLAIMIDAE Stekhoven and de Coninck, 1933

Axonolaimus subsimilis, new species

Description.—Cephalic setae 4, their length equal to cephalic diameter, and posterior to these 4 additional setae slightly longer than ½ cephalic diameter (fig. 2, L); subcephalic setae opposite mid-region of stoma, ½ corresponding body diameter in length. Amphids loop-shaped. *Male* unknown. *Female* 1.21 mm long; a, 22; β, 7.2; γ, 12; tail conically elongated.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41835.

Axonolaimus subsimilis appears to be most closely related to *A. paraspinosus* Stekhoven and Adam, 1931, and *A. typicus* de Man, 1922, differing from the first of these species in that the cephalic setae are 8 instead of 4 in number, and from the latter species in that the cephalic setae are only about 1/3 as long as the head width and subcephalic setae are absent.

Axonolaimus odontophoroides, new species

Description.—Cephalic setae 4, about 2/3 as long as cephalic diameter; subcephalic setae 6, of about equal length (fig. 2, N). Amphids short, loop-like in form. *Male* 1.34 mm long; a, 48; β, 11; γ, 9.9; spicules arcuate; tail bluntly elongated. A few supplementary organs, questionable in character, were observed. *Female* unknown.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41836.

Axonolaimus odontophoroides superficially resembles species of *Odontophora* in the form of the stoma; however, the denticular plates are not eversible, nor are they as strongly cuticularized as in *Odontophora.* This species appears to be most closely related to *A. paraspinosus,* but differs from that species both in the greater length and number of subcephalic setae as well as the form of the amphids.

Araeolaimus (*Araeolaimus*) *cylindrolaimus,* new species

Description.—Cephalic setae 4, about 1/2 as long as cephalic diameter; subcephalic setae absent; ocelli absent; amphids thin-walled, imperfect circle (fig. 2, P). *Male* 1.06 mm long; a, 39; β, 8.8; γ, 10; spicules arcuate; gubernaculum posteriorly directed. *Female* unknown.

Habitat.—Marine (depth of about 50 feet).

Locality.—Shackleford's Channel, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41837.

It appears that the transition in form of amphids, upon which the genus *Araeolaimoides* (originally proposed as a subgenus) is separated from *Araeolaimus,* invalidates the use of this character. Nevertheless, as a convenience the group *Araeolaimoides* may be considered as a subgenus. If this is done, the genus *Araeolaimus* may be subdivided into three groups of species, or subgenera. *Araeolaimus* differs from *Coinonema* and *Araeolaimoides* in that the

amphids are thin walled, broken circle in form, while the latter 2 subgenera differ from each other in that the amphids are 1 1/2 to 2 times the cephalic diameter from the anterior end in *Araeolaimoides* whereas in *Coinonema* they are 1 cephalic diameter or less from the anterior extremity. On this basis the species would be grouped as follows:

1. Subgenus *Coinonema* Cobb, 1920. Species.—*A.* (*C.*) *elegans* (de Man, 1888); *A.* (*C.*) *steineri* (Filipjev, 1922); *A.* (*C.*) *filipjevi* (Stekhoven and Adam, 1931); *A.* (*C.*) *longicauda* (Allgen, 1929); *A.* (*C.*) *ponticus* (Filipjev, 1922); *A.* (*C.*) *spectabilis* (Ditlevsen, 1921); *A.* (*C.*) *punctatus* (Cobb, 1920); *A.* (*C.*) *macrocirculus* Kreis, 1928, all new combinations.
2. Subgenus *Araeolaimoides* de Man, 1893. Species.—*A.* (*A.*) *microphthalmus* de Man, 1893; *A.* (*A.*) *zosterae* (Filipjev, 1918); *A.* (*A.*) *leptopharynx* Bresslau and Steckhoven, 1935.
3. Subgenus *Araeolaimus* de Man, 1880. Species.—*A.* (*A.*) *bioculatus* de Man, 1877; *A.* (*A.*) *zostericola* (Allgen, 1929), n. comb.; *A.* (*A.*) *tenuilaimus* (Allgen, 1929), n. comb.; *A.* (*A.*) *stenolaimus* (Steiner, 1919), n. comb.; *A.* (*A.*) *pellucidus* (Allgen, 1932), n. comb.; *A.* (*A.*) *mediterraneus* de Man, 1878; and *A.* (*A.*) *cylindrolaimus*, n. sp.

A. (*A.*) *cylindrolaimus* appears to be most closely related to *A.* (*A.*) *pellucidus* (Allgen, 1932) but differs from that species in that the amphids are situated more posteriorly.

Family COMESOMIDAE Stekhoven and de Coninck, 1933

Dorylaimopsis metatypicus, new species

Description.—Oral opening subtriangular; cephalic papillae consisting of an internal circle of 6 papillae and an external circle of 6 papillae (dd., el., and vv.) and 4 long setae (ld. and lv.). Cuticle coarsely punctuate in lateral areas, punctations irregular (fig. 2, S), finely punctuate dorsally and ventrally, punctations most marked in cephalic and caudal regions. Amphids dispiral. Stoma cylindrical, containing 3 teeth. Esophagus clavate. *Male* 1.62 mm long; a, 29; β, 8; γ, 12; spicules double jointed (fig. 2, U); gubernaculum directed posteriorly. Postanal setae few; 13 or more preanal papilloid supplementary organs. *Female* 1.9 to 2.1 mm long; a, 29; β, 9.4 to 9.8; γ, 13.3 to 13.5; vulva dividing body in proportions of 46.9:53.1 to 48:52.

Habitat.—Marine (depth of 15 feet and depth of 50 feet).

Locality.—Shackleford's Channel and near Point Lookout, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 31838.

Dorylaimopsis metatypicus differs from *D. punctatus* Ditlevsen, 1918, in that the punctations of the lateral areas are irregularly distributed and more numerous, there being only 4 longitudinal rows in *D. punctatus*, and that there are fewer postanal setae in the male, these being very numerous in *D. punctatus*.

Family CAMACOLAIMIDAE Stekhoven and De Coninck, 1933

Subfamily Aphanolaiminae, new subfamily

Diagnosis.—Camacolaimidae: Cephalic setae 4 (ld. and lv.); amphids circular or monospiral, very near anterior extremity; esophagus glandular (posterior part non-muscular). Male with cuticularized supplementary organs.

Type genus.—*Aphanolaimus* de Man, 1880.

The subfamily Aphanolaiminae differs from the subfamily Camacolaiminae in that the supplementary organs of the male are cuticularized instead of papilloid.

Anguinoides, new genus

Diagnosis.—Aphanolaiminae: Cuticle coarsely striated, striae interrupted by lateral alae. Amphids obscurely spiral, cephalic in position; cephalic setae 4,

long; stoma containing a massive, posteriorly bilobed stylet. Esophagus very glandular; nearly tylenchoid (fig. 3, A). *Male* with tuboid supplementary organs (fig. 3, B). *Female* with 2 reflexed ovaries.

Type species.—*Anguinoides stylosum*, n. sp.

Anguinoides stylosum, new species

Description.—Ocelli absent. *Male* 1.66 mm long; a, 60; β, 6.6; γ, 14.4; 6 preanal supplementary organs. *Female* 1.55 mm long; a, 33; β, 6; γ, 16.8; vulva dividing body in proportions of 53:47; ovaries reflexed, extending to within 1/3 and 1/4 body length from anterior and posterior extremities, respectively.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41839.

The genus *Anguinoides* appears to be most closely related to *Deontolaimus* de Man, 1880, but differs from that genus in the presence of cuticularized preanal supplementary organs. The writer sees no reason for assuming Cobb (1920, One hundred new nemas, Contrib. Sci. Nematology, IX, Baltimore, p. 303) in error regarding the tooth of *Onchium ocellatum*, as apparently Bresslau (in Steckhoven, 1935, Nematoda, in Die Tierwelt der Nord u. Osts., v. 5 b) assumed. It appears more probable that the latter author was dealing with a member of the genus *Anguinoides;* if so, the species should be renamed but the present author refrains from doing so, preferring that the material be restudied.

Family PLECTIDAE Oerley, 1880

Leptolaimus maximus, new species

Description.—Oral opening surrounded by 6 small lips bearing papillae of internal circle; external circle represented by 4 well developed setae (ld. and lv.). Amphids circular, with distinct internal tubes (fig. 3, C). Cuticle coarsely striated; lateral alae absent; somatic setae absent; sublateral glands present. Stoma cylindroid, narrow. *Male* (somewhat immature) 2.13 mm long; a, 51; β, 10; γ, 9. Supplementary organs 5 (fig. 3, F), widely spaced on ventral side of posterior third of body. *Female* unknown.

Habitat.—Marine (algae on breakwater).

Locality.—Cape Lookout, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41852.

Leptolaimus maximum differs from *L. papilliger* de Man, 1876, in the presence of cephalic setae and the smaller number of supplementary organs. It differs from *L. setiger* Stekhoven and de Coninck, 1933, in the form of the amphids and its greater size (*L. setiger* being only 950μ long). The discovery of this species appears to make the differentiation of *Dermatolaimus* Steiner, 1916, from *Leptolaimus* de Man, 1876, impractical since the amphidial form is not sufficiently distinctive. The species *Leptolaimus ditlevseni* (Steiner, 1916), n. comb., *L. elegans* (Steckhoven and de Coninck, 1933), n. comb., *L. trichodes* (Kreis, 1929), n. comb., and *L. parelegans* (Allgen, 1934), n. comb., all described in the genus *Dermatolaimus*, are hereby transferred to the genus *Leptolaimus*. All of these species are less than half as large as the present form.

Family LINHOMOEIDAE Filipjev, 1929

Desmolaimus zeelandicus var. *americanus*, new variety

Description.—Cephalic papillae consisting of an internal circle of 6 papillae; external circle consisting of 6 setae, 4 sublateral, 2 median. Amphids circular. Stoma with 2 "rings" (fig. 3, H); esophagus cylindrical, terminated by a well-developed bulb; esophago-intestinal valve (ventriculus of authors) elongated (fig. 3, G). *Male* 1.25 to 1.5 mm long; a, 36 to 43; β, 9 to 11; γ, 9 to 11; ventral preanal region of body very strongly ridged (fig. 3, I). *Female* 1.34 to 1.69 mm long; a, 24 to 31; β, 9 to 12; γ, 10 to 11; vulva dividing body in proportions of 48:52 to 51:49.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41840.

The present form is nearly identical with *Desmolaimus zeelandicus* de Man, 1880, differing from that species only in the presence of ridges in the preanal region of the male.

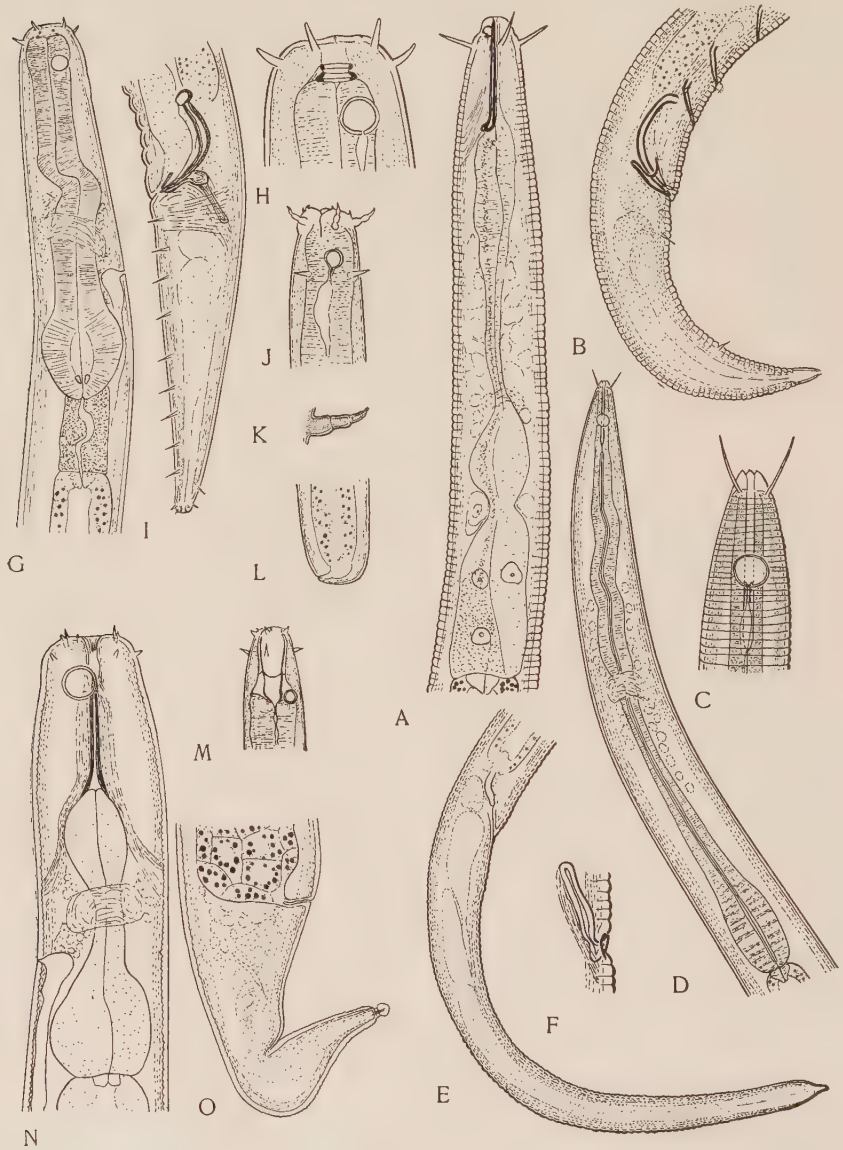

Fig. 3

A-B—*Anguinoides stylosum*. C-F—*Leptolaimus maximus* (F—Supplementary organ). G-I—*Desmolaimus zeelandicus* var. *americanus*. J-L—*Cytolaimium obtusicaudatum*. M—*Halanonchus macramphidus*. N-O—*Siphonolaimus conicus*.

Family MONHYSTERIDAE de Man, 1876

Cytolaimium obtusicaudatum, new species

Description.—Oral opening surrounded by 3 lips bearing 6 small papillae of internal circle; cephalic setae 6, superficially segmented (fig. 3, K). Amphid broken circle in form; (fig. 3, J); 4 subcephalic setae opposite level of amphids. *Male* unknown. *Female* (immature) 1.33 mm long; a, 39; β, 4.57; γ, 99.9+. Tail extremely obtuse, anus subterminal; caudal glands absent (fig. 3, L).

Habitat.—Marine (depth of 15 feet).

Locality.—Shackleford's Channel, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41841.

Cytolaimum obtusicaudatum differs from the only other species of the genus, *C. exile* Cobb, 1920, in the extremely obtuse form of the tail and the absence of caudal glands.

Halanonchus macramphidus, new species

Description.—Oral opening surrounded by 3 lips; cephalic setae consisting of 1 circle of 12 short setae; 4 subcephalic setae present. Amphids about 1/5 as wide as corresponding head diameter (fig. 3, M). *Male* unknown. *Female* 1.36 to 1.45 mm long; a, 31 to 43; β, 5.4 to 6.1; γ, 29 to 33; vulva dividing body in proportions of 20:80 to 24:76. Ovary extending to within about 1/2.5 body length from posterior extremity. Egg twice body diameter in length. Tail long, narrow, cylindrical.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41842.

Halanochus macramphidus differs from *H. macrurus* Cobb, 1920, in that the amphids are twice as large in proportion to the diameter of the body at their level.

Family SIPHONOLAIMIDAE de Coninck and Stekhoven, 1933

Siphonolaimus conicus, new species

Description.—Cephalic setae short, consisting of 6 conoid papillae and 4 small setae; subcephalic setae present. Stoma styletiform; stoma and 3 regions of esophagus (corpus, isthmus, and bulbar region) each about equal in length (fig. 3, N). Intestine containing pigment, nearly black. *Male* unknown. *Female* 4.86 mm long; a, 58; β, 29; γ, 35; vulva dividing body in proportions of 79:21. Tail conically elongated (fig. 3, O).

Habitat.—Marine (beach near low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U. S. N. M. Helm. Coll. No. 41843.

Siphonolaimus conicus differs from the majority of species in the genus by the extreme shortness of the cephalic setae; from the remaining species it may be differentiated by the conically elongate tail.

Family DESMOSCOLECIDAE Southern, 1914

Desmoscolex americanus, new species

Description.—Cuticle with 17 large annules (fig. 4, A) bearing concretions (fig. 4, B & C); 2 to 3 striae between annules; setae short, tuboid, subequal in length, arranged subdorsally in pairs on annules 1, 3, 5, 7, 9, 11, 13, 16, and 17, and subventrally on annules 2, 4, 6, 8, 10, 12, 14, and 15 (pair on annule 17 may be either subdorsal or subventral). Pigment spots present. *Male* 430μ long; a, 6.8; β, 4.4; γ, 4.8. *Female* 460μ long; a, 5.2 to 5.9; β, 5.2; γ, 5.2; Vulva (?) on 10th annule.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41851.

Desmoscolex americanus is extremely close to *D. hupferi* Steiner, 1916, but differs from that species in the separation of the annules by 2 to 3 striae.

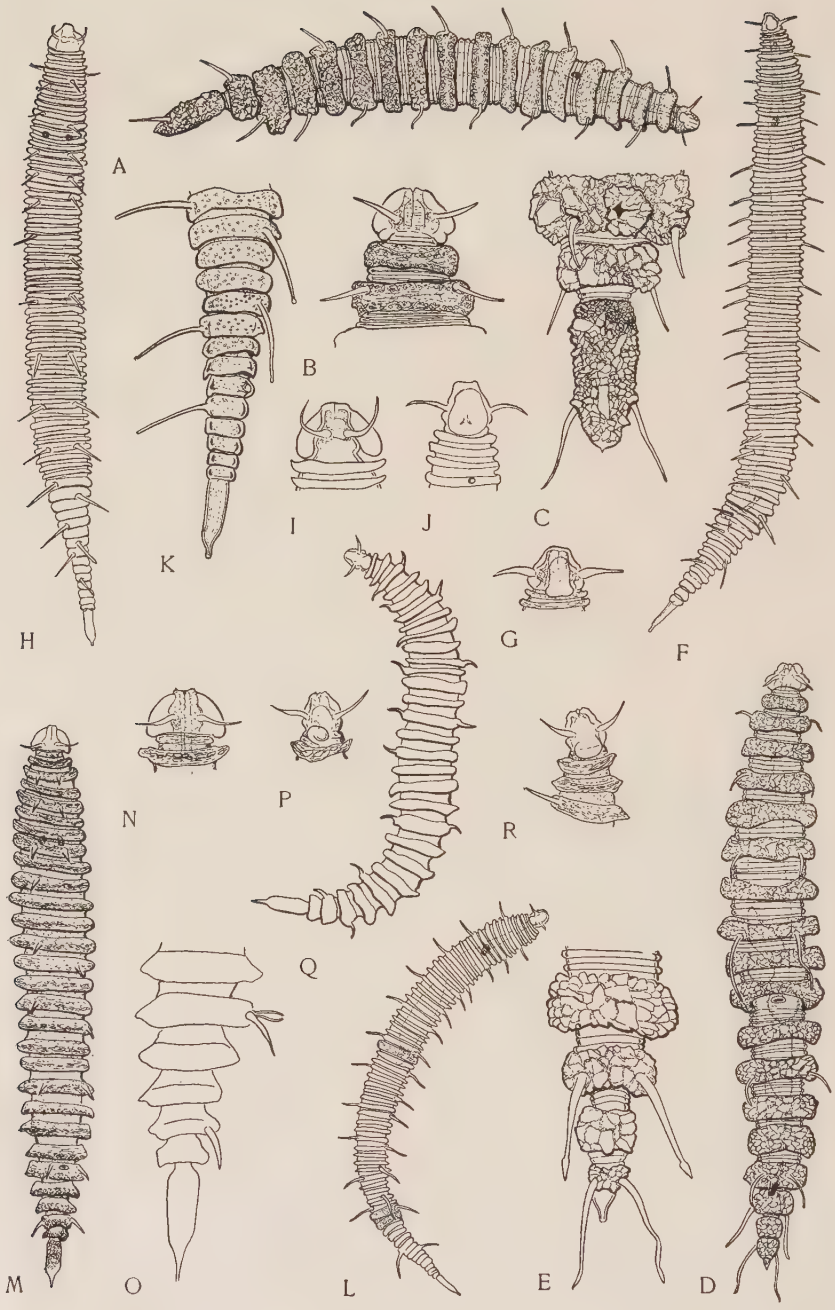

FIG. 4

A-C—*Desmoscolex americanus* (A—Male, lateral view. B—Head, ventral view. C—Tail of male, ventral view). D-E—*D. paraminutus* (E—Tail of female, dorsal view). F-K—*Tricoma adelphus* var. *cylindricauda* (F—Male, lateral view. G—Head of male, lateral view. H—Female. dorsal view. I—Head of female, dorsal view. J—Head of female, lateral view. K—Tail of female, lateral view). L—*T. spinosa*. M-R—*T. aurita* (M—Female, ventral view. N—Head of female, ventral view. O—Tail of female, lateral view. Q—Female, lateral view. P & R—Head of Q, right and left sides).

Desmoscolex paraminutus, new species

Description.—Cuticle with 18 large annules (fig. 4, D) bearing concretions; 2 to 3 striae between these annules. Setae (fig. 4, E) with elongate tips, subdorsal pairs on annules 1, 3, 5, 7, 9, 11, 13, 16, and 18; subventral pairs on annules 2, 4, 6, 8, 12 and 15; unpaired subdorsals on 4 (left side) and 6 (right side); subventral setae on 8th annule elongate. Pigment spots present. *Male* unknown. *Female* 470μ long; a, 6; β, 5.3; γ, 7.3; vulva dividing body in proportions of 56:44.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41850.

Only one other species of *Desmoscolex*, *D. adriaticus* Schepotieff, 1907, is described as having 18 annules. The present species differs from that species in that the interannular regions (fig. 4, D) are narrower than the annules in the regions in the present species, while they are much wider in the latter species. *D. minutus* Claparede, 1863, *D. laevis* Kreis, 1928, and *D. tenuiseta* Filipjev, 1922, are similar in having long subventral setae on the 8th annule but all of these forms have 17 annules.

Tricoma adelpha var. *cylindricauda*, new variety

Description.—Cuticle with dark annules (70-72) definitely separated but interannular striae absent (fig. 4, K); minute concretions on annules. Amphids massive (fig. 4, I). Lateral setae present on 4th annule (fig. 4, J); setae paired but pairs often staggered (fig. 4, H). Ocelli present. *Male* (fig. 4, F) 500μ long; a, 11.8; β, 6.3; γ, 5; body consisting of 70 annules (annules 55-56 partially fused); tail consisting of 12 annules; 13 pairs of subdorsal setae, 21 pairs of subventral setae. *Female* (fig. 4, H) 476μ long; a, 11; β, 5.4; γ, ?; position of vulva questionable. Body consisting of 72 annules; 13 pairs of subdorsal setae, 15 (or possibly 17) pairs of subventral setae.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41849.

Tricoma adelpha (Greeff, 1869) as described by Schepotieff (1908, Ztschr. Wiss. Zool. 100:191, pl. 8, figs. 17-19) has a more conoid tail than the present form; the setae are said to be irregularly distributed. Aside from these points, the present specimens appear to be the same, but because of the inadequate character of the early descriptions it seems best to give them varietal status until such time as specimens are described from the type locality.

Tricoma spinosa, new species

Description.—Cuticle with 66 coarse annules, annules 51-52 and 63-64 partially fused; annules dark, bearing minute concretions; annules 28 and 50-52 enlarged, dark brownish, chitinoid; setae elongate, subequal, pairs somewhat staggered, 12 pairs subdorsal, 14 pairs subventral, 2 pairs sublateral and preanal. Ocelli opposite annules 9-10. *Male* unknown. *Female* (fig. 4, L) 372μ long; a, 11.9; β, 6.3; γ, 5.1. Vulva on 28th annule, dividing body in proportions of 42:58; anus on 52nd annule.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41848.

Among the species of the genus *Tricoma* in which the cuticle has 60 to 70 annules, only *T. steineri* de Man, 1922, and *T. gracilis* Steiner, 1916, have body proportions approaching that of the present species (i. e., the value of a). The relatively great size of the thorny setae immediately differentiates *T. spinosa* from these species.

Tricoma aurita, new species

Description.—Cuticle with 29 deeply marked annules, somewhat separated but apparently without interannular striae (fig. 4, M); annules brownish, chiti-

noid, concretions minute. Amphids vesiculate, with indications of being unispiral (fig. 4, P). Setae short, subequal, spinate; 5 or (?) 6 pairs subdorsal, 9 pairs subventral; setae somewhat staggered (fig. 4, M). Ocelli at level of 7th annule. *Male* unknown. *Female* 410 to 431μ long; α, 6.3 to 8; β, ?; γ, 4.4; position of vulva questionable. Anus protruberant, on 24th annule.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41847.

Tricoma aurita differs from all other species of the genus *Tricoma* in the possession of only 29 annules.

The occurrence of the cestode *Moniezia benedeni* (Anaplocephalidae) in the American moose. Wm. L. Jellison, U. S. Public Health Service (Contribution from the Rocky Mountain Laboratory, U. S. Public Health Service, Hamilton, Montana.

Infestations in moose, *Alces americanus*, with intestinal cestodes determined by the writer as *Moniezia* sp. were recorded by Fenstermacher (1934, Minn. Agr. Expt. Sta. Bull. 308). The material has since been examined by Dr. G. Dikmans, of the U. S. Bureau of Animal Industry and through his courtesy the determination as *Moniezia benedeni* (Moniez) Blanchard is reported. The specimens were collected from a yearling moose autopsied near Grand Marias, Minnesota, October 11, 1933. Over 18 meters of tapeworm sections representing at least 3 individual worms were recovered from the small intestine. The longest unbroken section measured 3 1/2 meters after formalin fixation and contained over 1,000 segments. The host was very emaciated and definitely ill but this condition was not attributed to the *Moniezia* infestation.

Opuscula miscellanea nematologica, III. G. Steiner, U. S. Bureau of Plant Industry.

(1) A new species of rhabditis associated with a strawberry root rot

Dr. A. A. Hildebrand of the Dominion Laboratory of Plant Pathology in St. Catharines, Ontario, submitted samples of diseased strawberry roots containing large numbers of two nematode species. The disease, a root rot, occurs in the Niagara Peninsula and seems to be of a complex nature, various fungi being associated with these nematodes. The plants submitted came from an experiment, which is described as follows "On June 20th runners of strawberry plants growing in pots in the greenhouse were struck in autoclaved compost soil which, following sterilization, was artificially infested with a form of *Cylindrocarpon* (*Ramularia*) growing on sterilized crushed oats. The roots of the plants were examined microscopically on July 17th. The slides show mycelium and chlamydospores of the fungus (Cylindrocarpon), and an abundance of nematodes. The checks have remained absolutely healthy."

The two species of nematodes associated with this disease are *Rhabditis spiculigera*, n. sp., and *Neocephalobus elongatus* (de Man, 1880), n. comb., both present in large numbers. The relationship of these two nematodes to the disease may be that of a carrier in the case of *Rhabditis spiculigera*, whereas *Neocephalobus* may possibly be an agent in producing primary lesions and may be considered as a facultative parasite. However, no exact experiments demonstrating the existence of such an interrelationship have been made, the possible connection of the two forms with the fungi, as suggested above, being based on observations of other related species found under similar conditions. Since one of the two species of nematodes is new, a description follows:

Rhabditis spiculigera, n. sp. (fig. 5)

Notes in the files of N. A. Cobb indicate that he had observed this species twice, once in artificial cultures made by Dr. Honda of the University of Pennsylvania, and a second time in diseased sweet potatoes from New Brunswick, N. J., submitted by R. F. Poole, then of the New Jersey Agricultural Experiment Station. *Rhabditis spiculigera* belongs to the prodelphic group of *Rhabditis* having a single ovary, the vulvar opening being anterior to the anal opening a distance about equal to the length of the tail. The form can be recognized at once by the slender and remarkably long spicula in the male.

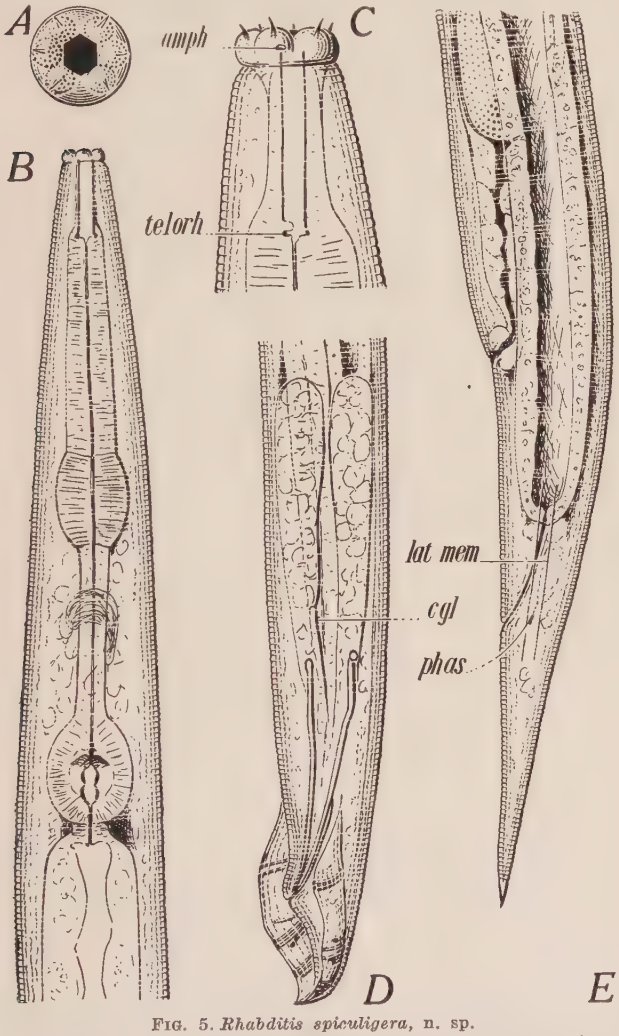

FIG. 5. *Rhabditis spiculigera*, n. sp.
A—Front view of head; X 1680. B—Side view of anterior end; X 650. C—Side view of head; *amph*, amphid; *telorh*, telorhabdion forming glottoid apparatus; X 1680. D—Left ventro-submedial view of male tail end; *cgl*, cement glands; X 650. E—Posterior end of female, side view; *phas*, phasmid; *lat mem*, lateral membrane; X 650.

Description.—Body of medium size. Tail of female irregularly conical, terminus pointed (fig. 5, E). Tail of male short, surrounded by bursa (fig. 5, D). Cuticle faintly annulated, with 2 low membranes or ridges bordering a lateral field of about 1/10 body width. Head with sharply set off lip region; lips spherical, well separated, each with a single setose papilla. Amphids small, slightly dorsal, behind lateral papillae. Buccal cavity rhabditoid, about 4 to 5 times as long as wide, with distinct glottoid apparatus (fig. 5, B & C); cheilorhabdions not seen. Esophagus typically rhabditoid, middle bulb slightly swollen, terminal bulb pear-shaped; valvular apparatus consisting of well developed ribbed valves, followed by 2 crescentic cuticularized pieces (fig. 5, B). Intestine consisting of 4 cells in circumference, usually filled with darkish reserve material. Phasmids present, almost level with

anal opening. Vulvar opening well marked by a diminution of the body diameter immediately behind. Ovary prodelphic, straight; not more than 2 eggs seen in the uterus at one time; eggs about 44μ by 18 to 20μ, thin-shelled, deposited after segmentation begins. A copulation mark often seen on females. Males with testis reflexed a short distance. Spicula of equal length, slender, slightly capitate proximally, distal end tapering to a fine point, yellowish brown, about 4 times as long as anal body diameter. Gubernaculum embracing about 1/3 of distal portion of spicula. A fine preanal papilla present. Bursa well developed, rib formula as follows: 2; () 5, 3, that is, 2 ribs preanal; a group of 5 in the middle region of tail and a group of 3 close to tail end. The first 2 reach edge of bursa, 3 ends on outside of bursa some distance from edge, 4, 5 and 6 reach edge of bursa, 7 ends as 3, 8 and 9 reach edge of bursa and 10 ends as 3 and 6.

Measurements.— ♀ : total length = 0.6 mm (0.58 to 0.63); a = 21.8 (20.1 to 23.6); β = 4.7 (4.5 to 4.8); γ = 11.6 (9.8 to 13.4); v = 82% (81 to 83%). ♂ : total length = 0.55 mm; a = 19.1; β = 4.5; γ = 9.5.

Diagnosis.—Rhabditis with peloderic male. Female prodelphic, with elongated, regularly conical, pointed tail. Lips 6, large and spherical, with single circle of 6 setose papillae. Buccal cavity without cheilorhabdions, with long protorhabdions, telorhabdions forming glottoid apparatus. Vulva about length of tail in front of anus; phasmid in region of anus. Spicula equal, separated, slender, twice the length of the tail; gubernaculum 1/3 spicula length; formula of bursal ribs 2; () 5, 3.

There is little doubt that *Rhabditis monhystera* Bütschli, 1873, of W. Schneider (1923, Zool. Anz. 56: 265-266, figs. 1a & b) belongs to the present species, not to that of Bütschli. It was de Man who first expressed doubt concerning the synonymy of these two forms. As far as may be concluded from Schneider's description and figures, his males exhibited only slight variations from the present specimens, a difference in the length of certain bursal ribs.

(2) A NEW NEOCEPHALOBUS SPECIES FEEDING ON A SPECIES OF CERATOSTOMELLA, A FUNGUS LIVING IN THE SCARLET OAK (QUERCUS COCCINEA MUENCH.) (FIG. 6)

In an agar culture (2½% malt and 2% agar) recently inoculated by Mr. Ross W. Davidson, Division of Forest Pathology, U. S. Bureau of Plant Industry, with heartwood of a living scarlet oak, growing near Mt. Jackson, Va., there developed large numbers of a nematode species, various bacteria and the fungus *Ceratostomella* sp. It is on this fungus that the nematodes feed and seem to be specialized.

The new species is tentatively placed in the genus *Neocephalobus*, as *N. leucocephalus*, n. sp. It exhibits characteristics similar to those of *Rhabditophanes* Fuchs, 1930, from which it differs in its amphidelphic female sexual apparatus, and in its esophagus which is more like that of *Neocephalobus*.

Description.—Cuticle thin, with very fine annulation often difficult to see; 2 low lateral membranes bordering lateral fields of about 2/7 body width. Tail in both sexes similar, elongated, conical, tapering into filiform, pointed terminus. Head region set off, not annulated, transparent, with 6 broad, convex lips, each with an apical, slightly setose papilla. Also an outer circle of 6 much smaller, rather obscure papillae present. Amphidial opening small, slightly behind outer papillar circle. Buccal cavity consisting of wide anterior and narrow, funnel-shaped posterior portion. Anterior portion 1¼ times as long as wide, only basal part with armed wall. This armature consisting of one (? two closely jointed)

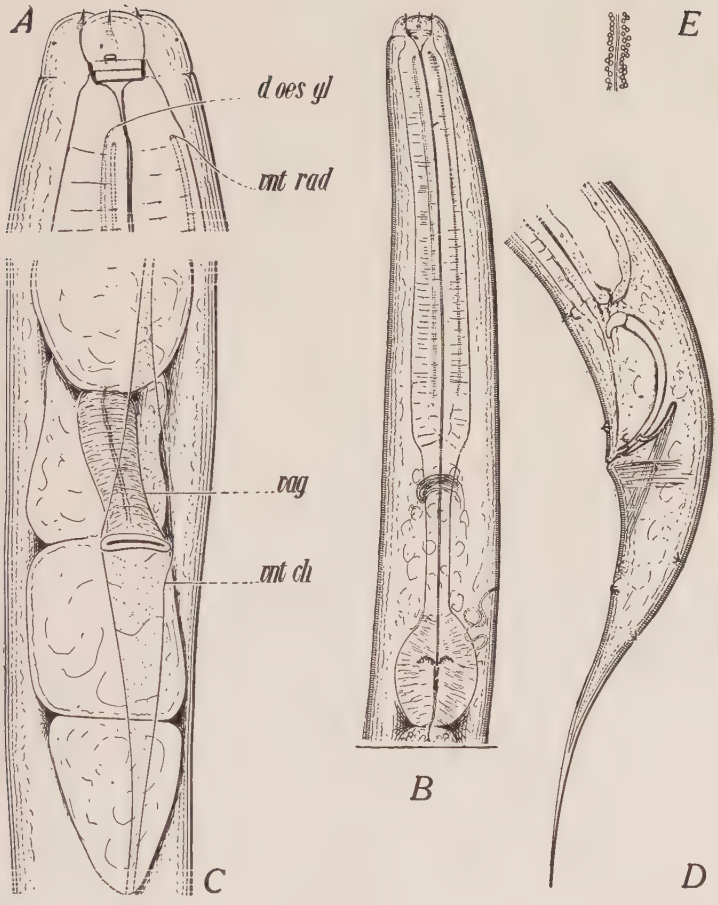

FIG. 6. *Neocephalobus leucocephalus*, n. sp.

A—Side view of head; *d oes gl*, outlet of dorsal esophageal gland; *vnt rad*, ventral radius of esophageal lumen; X 1400. B—Anterior end; X 530. C—Ventral view of vulvar region; *vag*, vagina; *vnt ch*, ventral chord; X 530. D—Tail end of male; X 530. E—Part of lateral portion of excretory canal as it appears in side view of a living specimen; free-hand sketch.

cuticular ring. Narrow, funnel-shaped posterior portion with 3 faintly marked, rodlike, cuticular thickenings. This portion indistinctly set off from esophagus (fig. 6, A), therefore apparently only prorhabdions properly developed; cheilorhabdions absent, meso- meta- and telohabdions reduced. Esophagus cephaloboid; middle bulb not set off from corpus, without valves; isthmus slender, terminal bulb rather large, spherical, with triple set of valves, the transverse ones with 5 ribs. Intestine having 2 cells in circumference; these cells filled with coarse granules, similar to, although generally smaller than, those of body cavity. Rectum about 1½ anal body diameters long, with 3 small rectal glands. Excretory system seemingly of the U-type, the branches reaching back to anal region; canal near excretory pore forming numerous windings inside ventral cell. Female

sexual apparatus with rather well developed postvulvar uterine branch; vagina leading forward and inward, tubular, very muscular; end of reflexed but straight ovary reaching, or in old specimens even passing, the anal region. Viviparous, up to 5 embryonate eggs or embryos in uterus. Male with end of testis slightly reflexed; spicula arcuate, slender, distal and bifurcate, proximal end somewhat hook-shaped, slightly capitate and walled off. Gubernaculum about 2/5 as long as spicula, distal portion lineate, proximal 2/3 of it double contoured with short spurs slightly embracing specula. Copulatory papillae as follows: Ventromedially, one a short distance in front of anus; ventro-submedially, one slightly anterior to the proximal end of the spicula, one in the anal region, somewhat variable in its position, and two close together at about the first third of the tail; dorso-submedially, one not quite in the middle of the tail.

Measurements.— ♀ : total length = 1 to 1.1 mm; a = 20.8 to 23.2; β = 5.9 to 6.4; γ = 7.6 to 7.9; v = 66 to 67%. ♂ : total length = 0.9 to 0.94 mm; a = 27 to 32; β = 4.9 to 5.5; γ = 7.4 to 9.7.

Diagnosis.—Species differentiated by: Transparent, set-off head with 6 equal lips, Rhabditophanes-like buccal cavity, inward- and forward-directed, remarkably long and muscular vagina, male copulatory apparatus, and shape of female and male tails.

Type locality.—United States (Mt. Jackson, Va.).

Type host.—*Ceratostomella* in scarlet oak wood.

(3) TWO NEW NEMATODES FROM DISEASED IRIS OCHROLEUCA PLANTS

In *Iris ochroleuca* L. plants grown near Babylon, Long Island, suffering from frost injury, an association of various nematodes, including 2 new species, was observed. It is thought that the abundance of these nematodes in the leaves of these plants was mainly responsible for their lack of recovery and their continued unhealthy appearance. The following species were present: *Diploscapter coronatus* Cobb, *Rhabditis monhystera* Bütschli, *Diplogaster* sp., *Rhabditolaimus* (*Rhabdontolaimus*) *prodelphis,* n. sp., *Neocephalobus elongatus* (de Man), *Eucephalobus nannus,* n. g., n. sp., *Aphelenchus avenae* Bastian, and *Aphelenchoides parietinus* (Bastian). Of these forms *Diploscapter coronatus* was most abundant. The heavy influx of nematodes into these plants is considered a result of the weakened condition of the irises following the frost injury. The first of the 2 new species observed, *Rhabditolaimus* (*Rhabdontolaimus*) *prodelphis,* is a member of a group of nematodes as yet known to occur only in association with bark beetles, living in their mines and frass and reported only from Central Europe. The second new species is a representative of that group of former cephalobs described as having only 3 lips. It is here proposed to combine these cephalobs into a new genus *Eucephalobus.*

Rhabditolaimus (*Rhabdontolaimus*) *prodelphis,* n. sp. (fig. 7)

Description.—A gracile representative of Fuchs' subgenus *Rhabdontolaimus* with a remarkably long, filiform tail of about 1/3 body length in both sexes. Cuticle rather finely annulated with a double series of points along lateral lines. Head broad-obtuse, with 3 low convex lips, each with single apical papilla. Amphids at about middle of buccal cavity, large, cup-shaped (fig. 7, A & B). Rather wide and cylindrical buccal cavity similar to that of *Rhabdontolaimus carinthiacus* Fuchs and *Rh. haslacheri* Fuchs, with single dorsal tooth, corresponding to dorsal mesorhabdion: cheilorhabdions short, pro- and mesorhabdions

longer, meta- and telorhabdions again short, latter on ventral side forming an obscure basal toothlike elevation. Esophagus diplogasteroid but terminal bulb of about same size as middle bulb, which is without well differentiated valves.

Female apparatus prodelphic. Male with very slender, arcuate spicula, pointed at distal end, barely capitate proximally. Gubernaculum slightly less than ½ spicula length, spatulate, with distal portion lineate. Three ventro-submedial setose copulatory papillae, one in region of inner end of spicula, one in anal region, and one close to base of filiform portion of tail about level with phasmids (fig. 7, C & D). The presence of small dorso-sublateral papilla slightly farther back (see ?, fig. 7, C) is not definitely settled.

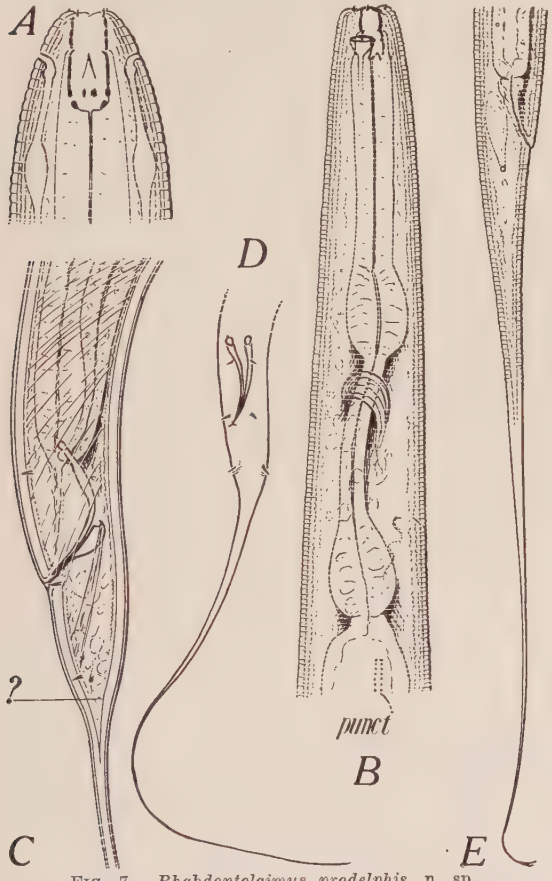

FIG. 7. *Rhabdontolaimus prodelphis*, n. sp. A—Head, ventral view; X 1680. B—Anterior end; *punct*, arrangement of punctation along lateral line; X 840. C—Anal region of male; X 840. D—Tail end of male; X 650. E—Tail end of female; X 840.

Measurements. — ♀: total length = 0.48 to 0.59 mm; $a = 24$ to 28; $\beta = 5$ to 6; $\gamma = 3$ to 3.3, v = 54 to 55%. ♂: total length = 0.44 mm; $a = 23$, $\beta = 5$, $\gamma = 3.2$.

Diagnosis. — This species differs from the 2 previously described forms of *Rhabdontolaimus* through the long, filiform tail in both sexes, the prodelphic ovary, the more slender spicula, a gubernaculum with lineate distal portion, the complete absence of any trace of a bursa and the presence of only 3 ventro-submedial copulatory papillae, one in the region of the inner end of the spicula, one anal, and one near the base of filiform portion of tail. Buccal structures also slightly different as well as punctations of cuticle.

Type locality.—United States (Babylon, Long Island).

Type host. — Diseased leaves of *Iris ochroleuca.*

Eucephalobus, n. g.

Diagnosis.—Cephalobs of typical structure but with only 3 lips.

Type species.—Eucephalobus oxyuroides (de Man, 1876).

Eucephalobus nannus, n. sp. (fig. 8)

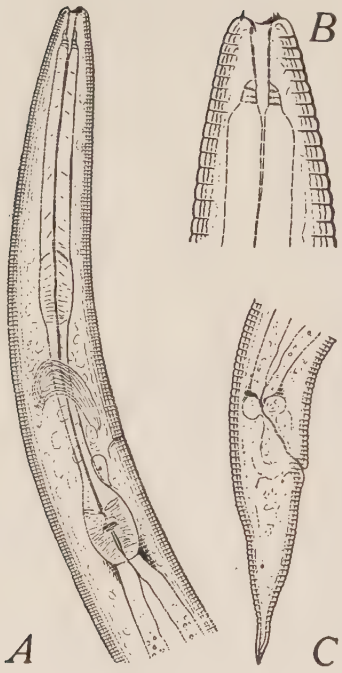

FIG. 8. *Eucephalobus nannus*, n. g., n. sp. A—Anterior end; X 650. B—Head; X 1680. C—Tail end; X 650.

Description.—A small species with female tail conical and about 2½ times as long as anal body diameter. Anteriorly body tapering to continuous, obtuse head end, not set off; cuticle with plain annulation. Lips broad, obtuse, each apparently with single setose papilla. Amphids obscure. Buccal cavity conical, tubular, with only cheilo- and prorhabdions developed; other armature plates missing, but their positions marked by breaks in tissue surrounding posterior portion of buccal cavity (fig. 8, B). Esophagus with middle bulb as wide as and only slightly differentiated from corpus; isthmus quite long; terminal bulb pear-shaped, with full set of valves. Phasmids near middle of tail. Female apparatus typically cephaloboid, reflexed, ovary straight.

Measurements.—♀ (young): total length = 0.34 mm; $a = 16$, $\beta = 3.8$; $\gamma = 6.1$; v = 53%.

Diagnosis.—*Eucephalobus* with low, broad, obtuse lips, each with small apical, setose papilla. Buccal cavity conical, tubular, armature consisting of only cheilo- and prorhabdions. Tail of female conical, pointed, about 2½ times as long as anal body diameter.

Type locality. — United States (Babylon, Long Island).

Type host.—Diseased leaves of *Iris ochroleuca.*

Comparative morphology and development of infective larvae of some horse strongyles. JOHN T. LUCKER, U. S. Bureau of Animal Industry.

Recent reports by Poluszynski (1930, Tierärztl. Rundschau, 36: 871-873), Wetzel (1931, J. Parasitol., 17:235) and the writer (1934, J. Wash. Acad. Sci., 24:302-310; 1935, J. Parasitol., 21:381-385) have provided comparative data on the morphology of the infective larvae of the following species of strongyles parasitic in horses: *Strongylus vulgaris, S. equinus, S. edentatus, Posteriostomum ratzii* and *Cylicodontophorus ultrajectinus.* The present paper contains observations on the comparative morphology and the development of the infective larvae of three additional species of strongyles infesting horses.

Utilizing methods of culture described in the present writer's two earlier papers mentioned above, infective larvae were obtained from separate cultures prepared from eggs removed from the uteri of individual adult females of the following species: *Cylicocercus goldi, C. catinatus* and *Gyalocephalus capitatus.* Varieties of *C. goldi* and *C. catinatus* were disregarded, following the usage of most recent writers.

Gyalocephalus capitatus (fig. 9, A). The following description of the infective larvae is based upon the examination of about 10 specimens: General structure similar to that of previously described horse strongyle larvae. Intestine consisting of 12 cells. Optical section of vestibule showing anterior margin forming an inverted cuticularized V, followed posteriorly by 2 short parallel cuticular rods uniting posteriorly with lumen of esophagus (fig. 9, B). Tail of larva terminating in a small bulbous process (fig. 9, C). Marked constriction of sheath in region immediately posterior to caudal tip of larva; in optical section of this region, walls of sheath greatly thickened, with resultant sudden reduction of lumen to a fine canal. Measurements of the larva as follows: Length of sheath, 662 to 687μ; length of larva excluding sheath, 420 to 457μ;

length of esophagus, 142 to 152μ; distance from anterior end to nerve ring, 90 to 93μ, to excretory pore, 101 to 105μ; width of larva at posterior end of esophagus, 20 to 22μ; distance from posterior end of esophagus to genital primordium, 109 to 129μ; distance from genital primordium to anus, 130μ; length of tail, 34 to 40μ; length of tail of sheath, 230 to 242μ.

Cylicocercus goldi (fig. 9, D). The following description of the infective larvae is based upon the examination of about 20 specimens: General structure nearly identical with that described previously for infective larvae of *Cylicodontophorus ultrajectinus*. Intestine consisting of 8 cells. In lateral view of vestibule, optical section showing a cuticularized funnel-shaped posterior portion, uniting posteriorly with lumen of esophagus and separated slightly from 2 anterior short parallel or slightly convex cuticular rods (fig. 9, E). Tail of larva tapering, terminating in a bluntly rounded tip. In optical section walls of sheath showing some thickening in region immediately posterior to caudal tip of larva; diameter of lumen of sheath in this region diminishing rather gradually (fig. 9, F). Size relationships of 10 infective larvae of *C. goldi* are given in table 1.

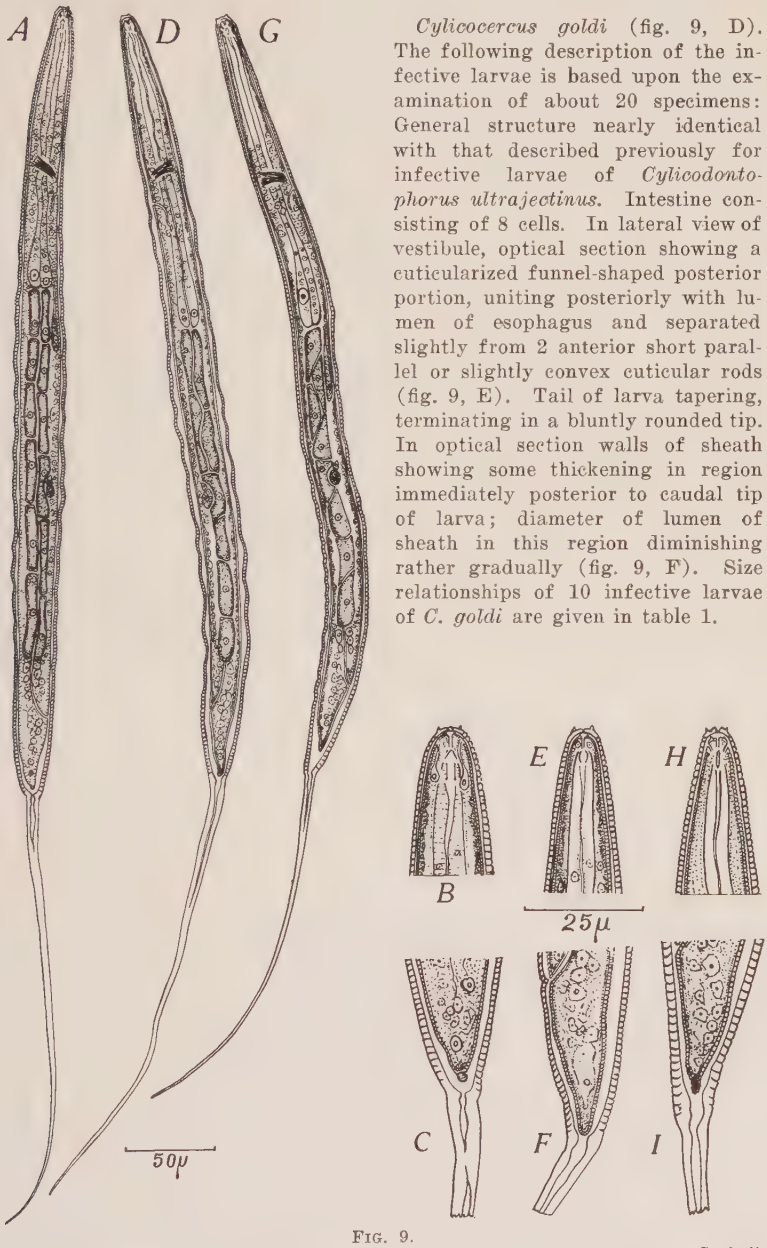

FIG. 9.

A-C—*Gyalocephalus capitatus* (infective larva). A—Lateral view. B—Cephalic extremity showing structure of vestibule. C—Caudal region showing tip of larval tail and structure of sheath. D-F—*Cylicocercus goldi* (infective larva). D—Lateral view. E—Cephalic extremity showing structure of vestibule. F—Caudal region showing tip of larval tail and structure of sheath. G-I—*Cylicocercus catinatus* (infective larva). G—Lateral view. H—Cephalic extremity showing structure of vestibule. I—Caudal region showing tip of larval tail and structure of sheath.

TABLE 1—*Size relationships of 10 infective larvae of Cylicocercus goldi*
(*All measurements in microns*)

Specimen number	1	2	3	4	5	6	7	8	9	10
Length of sheath	682	660	668	684	651	616	605	747	678	693
Length of larva	440	418	422	438	415	376	365	467	413	453
Width of sheath in region of esophageal bulb	28	24	24	27	23	25	25	25	25	22
Width of larva in region of esophageal bulb	21	18	20	19	18	18	19	18	19	18
Distance from anterior end to nerve ring	78	80	79	82	73	77	70	108	88	84
Distance from anterior end to excretory pore	....	106	103	107	106	97	84	120	101	108
Length of esophagus	180	170	160	176	162	165	152	169	167	167
Distance from posterior end of esophagus to genital primordium	91	91	91	112	88	52	63	101	75	104
Distance from genital primordium to anus	127	112	127	112	120	120	112	150	130	140
Length of tail of sheath	242	242	246	246	246	240	240	280	265	240
Length of tail of larva	35	38	37	31	38	32	31	40	34	35

Cylicocercus catinatus (fig. 9, G). The following description of the infective larvae is based upon the examination of about 50 specimens: General structure practically identical with that of infective larva of *C. goldi*. Intestine consisting of 8 cells. Nucleus of dorsal esophageal gland exceptionally prominent and large, approximately 6.5μ in diameter. In optical section vestibule appearing in dorsal or ventral view as a minute, elongate, cuticularized hexagon; terminal anterior portion of esophageal lumen strongly cutinized (fig. 9, H). Tail of larva tapering, terminating in a rounded finger-like tip. Walls of sheath showing some thickening in region immediately posterior to caudal tip of larva, diameter of lumen sheath in this region diminishing rather gradually (fig. 9, I). Size relationships of 10 infective larvae of *C. catinatus* are given in table 2.

TABLE 2—*Size relationships of 10 infective larvae of Cylicocercus catinatus*
(*All measurements in microns*)

Specimen number	1	2	3	4	5	6	7	8	9	10
Length of sheath	648	615	640	644	682	597	589	625	620	636
Length of larva	430	381	401	402	434	375	385	411	400	404
Width of sheath in region of esophageal bulb	21	22	24	20	27	26	26	22	22	26
Width of larva in region of esophageal bulb	18	15	17	15	18	17	18	18	17	18
Distance from anterior end to nerve ring	80	67	77	82	84	82	76	88	82	83
Distance from anterior end to excretory pore	101	91	94	96	98	96	93	101	98	94
Length of esophagus	156	162	158	166	176	163	155	169	169	163
Distance from posterior end of esophagus to genital primordium	86	70	79	84	88	63	73	84	55	77
Distance from genital primordium to anus	140	112	127	131	128	112	118	114	135	121
Length of tail of larva	41	30	31	25	36	31	32	37	34	37
Length of tail of sheath	218	234	239	242	248	222	204	214	220	232

Poluszynski and also Wetzel have shown that the infective larvae of *Strongylus vulgaris, S. equinus* and *S. edentatus* differ characteristically. Comparison of published data pertaining to the infective larvae of *S. equinus* and *Poteriostomum ratzii* indicates that the larvae of both species have 16 intestinal cells; however, larvae of these 2 species differ markedly in size; furthermore, the shape and structure of the tip of the tail are noticeably dissimilar. Additional study of the larvae of these 2 species shows also that the structure of the sheath in the region immediately posterior to the caudal end is different in the 2 species. Unlike the sheath of *P. ratzii* larvae, that of the larva of *S. equinus* tapers gradually to the posterior tip and is without marked constriction in the region occupied by the caudal end of the larva. Since there is no noticeable increase in the thickness of the sheath at this point, the lumen gradually diminishes in diameter toward the posterior tip. As is shown elsewhere in this paper, the larvae of *Cylicocercus goldi* and *C. catinatus* have 8 intestinal cells; they differ in this respect from the larvae of all other species mentioned in the first paragraph of this paper, except *Cylicodontophorus ultrajectinus.* Examination of the data in tables 1 and 2 indicates that on the average the infective larvae of *C. catinatus* are shorter and narrower than those of *C. goldi;* the data show also that the size relationships of larvae of these 2 species greatly overlap and are of no differential value. A comparison of the size relationships of the larvae of these 2 species with those previously reported by the writer (1935) for larvae of *Cylicodontophorus ultrajectinus,* which larvae also have 8 intestinal cells, indicates that on the average the larvae of the latter species are larger than those of *C. goldi* and *C. catinatus.* Due to overlapping of individual measurements, however, size is of no differential value. One rather striking difference between larvae of *C. goldi* and those of *Cylicodontophorus ultrajectinus* is shown by the ratio of the length of the larvae to the length of the tail of the sheath, this ratio being from 1.5:1 to 1.8:1 for the larvae of *C. goldi* and from 2:1 to 2.7:1 for larvae of *C. ultrajectinus.* The corresponding ratio for the larvae of *C. catinatus* is from 1.6:1 to 2:1. The writer has described and figured minute differences in the structure of the vestibule in the larvae of the 3 species in question. The possibility that the disposition of the elements of the vestibule in individuals killed in various ways may be influenced by the state of contraction of the contiguous muscles should be considered, but so far as was determined by examination of a limited number of larvae of the 3 species the differences referred to were constant. The structure of the sheath in the post-caudal region is extremely similar in larvae of *C. goldi* and *C. catinatus* as shown by the figures, but this structure differs slightly from that found in *C. ultrajectinus* larvae. The fact that 12 intestinal cells occur in the infective larva of *Gyalocephalus capitatus* distinguishes this larva from those of all other species mentioned in this paper.

In connection with the development of larvae in the cultures, it was noted that rhabiditiform first-stage larvae hatched from the eggs of *Gyalocephalus capitatus* and *Cylicocercus catinatus* in 24 to 48 hours after the cultures were started. Several larvae of *C. catinatus* were observed in the first molt about 72 hours after the cultures were started, the sheath being cast off in the usual manner. Larvae of *G. capitatus* were seen undergoing the first ecdysis after a similar lapse of time, but the cuticle was retained; this retention may be due to the fact that the larvae were in a liquid medium. The exact time of the occurrence of the second ecdysis was not observed, but molted, ensheathed, strongyliform larvae of both species were present on the fifth day after the cultures were started. The usual 2 preparasitic molts occurred, therefore, during the development of infective larvae of these species. Eggs of *Cylicocercus goldi* hatched in 24 hours, and ensheathed strongyliform larvae first appeared in the cultures 4 days later; no attempt was made to determine the time of occurrence of the first molt.

***Metroliasthes lucida*, a cestode of galliform birds, in arthropod and avian hosts.** MYRNA F. JONES, U. S. Bureau of Animal Industry.

INTRODUCTION

Metroliasthes lucida Ransom, 1900, a cestode of common occurrence in turkeys, has been developed experimentally in turkeys (*Meleagris gallopavo*) and in guinea fowls (*Numida meleagris*) by feeding to the birds cysticercoids from the grasshoppers *Melanoplus* species, *Chorthippus curtipennis* and *Paroxya clavuliger*. The birds were held in confinement under carefully controlled experimental conditions. Cysticercoids of *M. lucida* have been reported previously by the writer (Jones, 1930, J. Parasitol. 17 (1): 53) from the grasshoppers *Melanoplus differentialis* and *Melanoplus* species, but since attempts to develop the adult cestode in birds were unsuccessful at that time, the recent positive results constitute the first experimental demonstration of the complete life cycle. In addition, cysticercoids were recovered from a grasshopper, *Schistocerca damnifica*, 38 days after it had been fed 3 segments of *M. lucida*, but no birds were infected with the material. Cysticercoids and developing larvae, similar to those obtained from grasshoppers, have been found in the beetles *Aphodius* species and *Cratacanthus dubius* after experimental feedings, but since birds fed with these larvae remained negative for cestodes, the evidence is incomplete that beetles actually serve as effective intermediate hosts for *M. lucida*. All insects recorded above were fed with gravid segments of *M. lucida* from turkeys or from guinea fowl.

Observations on developing larvae, a description of infective larvae, and a consideration of adult specimens in definitive hosts are included in the present paper.

Miss Eugenia Cuvillier, formerly of the Zoological Division, U. S. Bureau of Animal Industry, assisted with experimental work. Identifications of grasshoppers were made by Mr. A. N. Caudell of the U. S. Bureau of Entomology and Plant Quarantine; identifications of beetles were made by Mr. L. Buchanan of the same Bureau and by Dr. E. A. Chapin of the U. S. National Museum.

SOURCE OF LARVAL MATERIAL

Cestode larvae were obtained from insects only after experimental feedings with gravid segments of *M. lucida* from turkeys or guinea fowl. About half of the grasshoppers used were laboratory reared, a number of those used being nymphs; the remaining grasshoppers and the beetles which were used were collected in the District of Columbia or in nearby Maryland. Many of the grasshoppers were force-fed with a known number of segments, the ages of the resulting larvae being more accurately estimated in such cases.

DEVELOPMENT IN INTERMEDIATE HOSTS

Oncospheres of *M. lucida* are about 30μ in diameter; embryonal hooks 20 to 25μ long. Embryonal activity has been observed in gravid segments attached to strobilae collected at necropsy, in segments from fresh droppings, and in segments partially dry when collected.

Active hatched embryos were observed in the digestive tract of a grasshopper 2 hours after it had been fed 1 gravid segment of *M. lucida;* in the same insect there were other active embryos still within the embryophores and also a few inactive, unhatched embryos. An inactive, ovoidal larva, about 50 by 42μ in size, with embryonal hooks 21 to 22μ long, was obtained from the thoracic region of a grasshopper dissected 48 hours after being fed a segment of *M. lucida;* a few eggs containing inactive embryos were observed in the digestive tract of the same insect. The rate of development varied considerably, temperature and, possibly, the species of intermediate host being important factors; however, the sequence of developmental phases appeared to be as follows: After

the larva penetrates into the body cavity of the insect it becomes inactive, assumes an ovoidal or elongate form, and increases in size. Embryonal hooks are arranged toward one extremity, herein designated as the hook-bearing or posterior pole, the opposite extremity consequently being termed the anterior pole (fig. 10, A).

The first constriction occurs toward the posterior pole, partially cutting off a posterior caudal region which contains the embryonal hooks; a second constriction appears anterior to the equator of the body, resulting in a larva with body divided into 3 regions, a prominent anterior region which represents the future scolex, a larger mid-region representing the outer wall of the future cysticercoid, and a smaller posterior or caudal region, the whole larva being incased in a contractile adventitious membrane formed by the host. Subsequently proliferation and concentration in the anterior region occurs; the developing suckers are indicated by 4 more densely fibrous and deeply staining areas which acquire circular outline; calcareous corpuscles develop in the anterior region; fibrous tissue becomes prominent in the mid-region; invagination (fig. 10, B) begins at this time, a thin cuticula and a subcuticular layer with prominent, closely-packed nuclei being evident. The scolex is completely differentiated only after invagination has taken place. The infective larva (fig. 10, C, D) with its protective membrane is comparatively large, being about 756 to 850μ by 532 to 720μ in size and readily visible to the naked eye. The outer contractile membrane varies greatly in shape, especially in heavy infestations; when free of the host tissue it may be globular or somewhat pear-shaped. The outer membrane itself, a thin connective tissue, is fragile and in fresh material is easily broken. The cysticercoid proper is ovoidal or, less commonly, globular in shape. Fresh unfixed specimens vary in size from about 375 to 655μ by 325 to 532μ in size. The walls of the cysticercoid consist of an outer clear cuticula, beneath which there are visible in fresh material a thin layer, delicately laminated in appearance, and internal to it a slightly thicker striated layer; internal to the latter is the subcuticular region with nuclei close together, then a region of loose fibrous tissue which contains a few calcareous corpuscles and which merges into a more definitely fibrous or muscular layer marking the boundary of the outer cyst wall. In fresh unfixed specimens the region internal to this muscular layer, including the scolex,

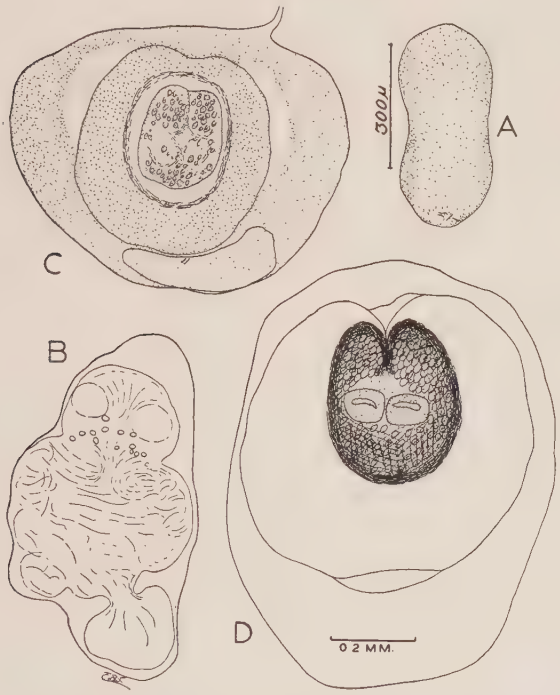

FIG. 10. *Metroliasthes lucida* from grasshoppers.
A—Young elongate larva with embryonal hooks. B—Larva beginning invagination at 7 to 9 days. C—Completely invaginated larva (infective ?), caudal appendage within adventitious membrane. D—Infective cysticercoid, drawn from living specimen.

is almost completely obscured by calcareous corpuscles. Fixed specimens reveal a space of varying thickness separating the outer cyst wall and inner cyst wall except in the region surrounding the invagination pore. The inner cyst wall is also fibrous tissue, its inner boundary being a thin cuticula which is a continuation of that covering the scolex. The scolex, lying in a small invagination cavity, is unarmed and without rostellum, and as fixed material measures about 160 to 190μ in diameter; suckers, definitely muscular when completely differentiated, are 77 to 105μ in diameter. Active flame cells have been observed in scolices of fresh specimens. Although the scolex of the cysticercoid does not evaginate readily, it may be active within the cyst membranes. This activity of the scolex and the muscular development of the suckers are the most useful criteria for judging whether cysticercoids have reached the stage which is infective for definitive hosts.

The size of the caudal appendage, which bears the embryonal hooks, varies considerably; it is possible that this variation may be correlated with the size (and species ?) of intermediate host and with the number of cysticercoids present, but conclusive data are lacking. In one specimen a small caudal appendage, lying within the adventitious membrane and lateral to the cyst proper, was about 350 by 100μ in size, less than half the size of the cyst proper; in other specimens the caudal appendage was actually larger than the cyst. The caudal appendage consists of tissue showing little differentiation, the innermost region being loose tissue or an irregular cavity. The caudal appendage with its hooks usually becomes detached when the adventitious membrane of infective cysticercoids is broken.

Development of cysticercoids in grasshoppers to a stage infective for birds required only 15 days in July; in January and February, cysticercoids, although apparently completely formed, were still non-infective 6 weeks after insects had been fed tapeworm segments.

Location and Numbers of Cysticercoids in Experimentally Infected Arthropods

Cysticercoids have been found in head, thoracic and abdominal regions of grasshoppers, and in heavily infested insects may appear as scattered white or yellowish spots on and within the tissue of the host. The exact number of cysticercoids present in most of the insects used in experiments is unknown, as parts of the insects were fed to birds without being completely dissected. However, as few as 2 cysts have been found and in one case as many as 296 cysts were counted; in the latter case the grasshopper had been fed with 2 gravid segments of *M. lucida*. Between 12 and 30 cysticercoids were the numbers more frequently observed in grasshoppers; 2 cysticercoids were obtained from a dung beetle, *Aphodius* species, in one instance and at least 20 cysts were obtained from another specimen of *Aphodius*.

Experimental Development in Definitive Hosts

Birds used in this work during the years 1933 to 1935, inclusive, were fed cysticercoids from grasshoppers and beetles as listed in Table 1. No cestodes other than *M. lucida* were found in the birds, and control birds remained free of cestodes. Three turkeys and 2 guinea fowls, fed cysticercoids from grasshoppers, became infested with *M. lucida;* 2 guinea fowls, 1 fed cysticercoids from grasshoppers and the other fed cysticercoids from a beetle, remained negative for cestodes. The turkeys and guinea fowls used were hatched during June and July of 1934. Only young chicks were used. Five chicks fed cysticercoids from grasshoppers and 2 chicks and 1 quail fed cysticercoids from beetles all remained negative for cestodes. One chick was given gravid segments of *M. lucida* to test the possibility of a direct development but had not become infected when examined after 8 weeks.

TABLE 1.—*Experimental data on birds fed M. lucida larvae*

Bird	No.	Feedings and source of larvae*	Fecal examination findings	Date of necropsy	Post-mortem findings
Turkey	570	Aug. 1, 1934 Aug. 6, 1934		Aug. 20, 1935	15 nearly mature tapeworms
"	594	Aug. 7, 1934	Segments in feces Aug. 27 to Oct. 16; no segments Oct. 31 to Dec. 6	Dec. 7, 1935	No helminths
"	264	Aug. 27, 1934	3 segments *M. lucida* Oct. 6	Oct. 8, 1934	2 tapeworms
Guinea fowl	209	July 28, 1935	4 segments *M. lucida* Aug. 29	Oct. 8, 1935	13 tapeworms
"	081	Aug. 27, 1935	2 segments *M. lucida* Oct. 6; strobila, no head, Nov. 26; no segments Nov. 28-Jan. 2	Jan. 8, 1935	1 tapeworm
"	957	Oct. 25, 1934	No segments Nov. 20 to Dec. 10	Dec. 12, 1934	No helminths
"	781	Nov. 20, 1934 (cysts from beetle)	No segments Dec. 10, 1934, to Jan. 2, 1935	Jan. 8, 1935	No helminths
Chick	5	May 9, 1933 (2 cysts from beetle)		June 2. 1933	No helminths
"	091	Oct. 9, 1934		Oct. 16, 1934	No helminths
"	099	Oct. 25,1934		Oct. 31, 1934	No helminths
"	841	Dec. 6, 1934		Jan. 22, 1935	No helminths
"	571	Jan. 24, 1935 Feb. 15, 1934		Feb. 19, 1935	No helminths
"	023	Jan. 24, 1935		Feb. 10, 1935	No helminths
Quail	793	Dec. 7, 1934	Negative to date		
Chick	1a	April 13 & 14,** 1933		June 8, 1933	No helminths

*All cysticercoids from grasshoppers unless otherwise stated.

**Bird fed gravid segments instead of larvae of *M. lucida*.

Specimens of *M. lucida* obtained from poult No. 570, which had been fed cysticercoids 14, 16 and 19 days previously, were apparently not yet fully matured as no detached gravid segments were present in the intestine when the bird was killed nor had segments been recovered previously from droppings. However, segments of *M. lucida* were passed in droppings of poult No. 594 twenty days after the bird had been fed with cysticercoids. This bird lost its infection certainly within 121 days, and possibly within 85 days. Guinea fowl No. 081 remained infested with *M. lucida* for 134 days, the bird being killed at the end of that time.

Adult of Metroliasthes lucida

Description.—Mature worms up to about 20 cm long by 2.5 mm wide. Scolex 700 to 750μ in diameter; suckers unarmed, 200 to 250μ in diameter; rostellum and hooks lacking. Genital pores irregularly alternate, near middle of segment margin or, in gravid segments, definitely posterior to middle of segment margin. Testes 20 to 40, in posterior region of segment. Cirrus pouch cylindrical, about 400μ long, crossing excretory canals in mature segments but barely reaching to ventral canal in most gravid segments; cirrus armed with long spines forming a characteristic dark central region in the cirrus pouch. Ovary approximately in middle of segment, anterior to testes, its anterior border lobed, its posterior border concave. Uterus, when fully developed, appearing as 2 more or less fused sacs lying side by side in posterior region of segment. Paruterine organ developing as a conical fibrous structure anterior to uterus; eggs passing out of uterus into paruterine organ, the latter structure serving as a heavy-walled egg capsule, prominent in fresh gravid segments as an opaque white or yellowish mass. Egg ovoid, with 3 membranes, about 75μ by 50μ in diameter; oncosphere about 30μ in diameter; embryonal hooks 20 to 25μ long. Gravid segments, rather than individual eggs, usually present in droppings.

Definitive hosts and known range of distribution of adult

M. lucida has been reported from the following Galliformes: *Meleagris gallopavo, M. gallopavo sylvestris, Gallus gallus, Numida meleagris, Numida*, sp., *Caccabis rufa* and *Coturnix rufa*. It occurs most commonly in turkeys (*M. gallopavo*).

M. lucida has been reported from North America, Europe, Africa, Asia (India) and Australia. The available evidence indicates definitely that it was originally and normally a parasite of the American turkey, and that it has spread with its host from North America to 4 other continents.

Summary

Three turkeys and 2 guinea fowls became infested with *Metroliasthes lucida* after being fed cysticercoids from grasshoppers (*Melanoplus* species, *Chorthippus curtipennis*, and *Paroxya clavuliger*); 2 guinea fowls, 7 chicks and 1 quail remained negative for tapeworms after being fed cysticercoids of *M. lucida* from grasshoppers or beetles. Cestode larvae, determined as those of *M. lucida*, were recovered from the grasshopper *Schistocerca damnifica* and the beetles *Aphodius* species and *Cratacanthus dubius* but no birds were infected with this material. All infested insects had been fed with gravid segments of *M. lucida* from turkeys or guinea fowl.

The time necessary for development of the infective cysticercoid in the insect host varies from 15 days in July to 6 weeks or more during winter, at room temperatures. Approximately 3 weeks are necessary for development of the adult worm; the minimum time observed was 20 days in a guinea fowl. One guinea fowl remained infested for a period of 134 days. Descriptions of larva and of adult tapeworm are given.

A new heterophyid trematode of the genus *Ascocotyle* (Centrocestinae).

E. W. Price, U. S. Bureau of Animal Industry.

On December 28, 1929, several specimens of a heterophyid trematode were collected by Mr. Allen McIntosh from the small intestine of a white ibis killed at Cape Sable, Florida. The specimens were kindly placed at the writer's disposal and on examination were found to represent a new species of the genus *Ascocotyle* Looss.

Ascocotyle mcintoshi, n. sp.

Description.—Body elongate piriform (fig. 11), 680μ to 1.2 mm long by 192 to 368μ wide. Cuticle covered with small scale-like spines except around excretory aperture. Anterior end of body 44 to 64μ wide and provided with a triangular dorsal lip. Oral aperture terminal and surrounded by a double coronet of spines, 18 to 20 spines in each row; spines of anterior row about 18μ long, those of posterior row about 11μ long. Oral sucker elongate conical, its apex lying about 1/2 the distance between oral aperture and pharynx; acetabulum 44 to 82μ in diameter, its cavity opening into genital sinus. Prepharynx slender, 148 to 240μ long; pharynx 37 to 66μ long by 37 to 56μ wide; esophagus about 22 to 55μ long; intestinal ceca slender, extending posteriorly to level of anterior margins of testes. Genital aperture median or submedian, postequatorial; genital sinus spacious, containing a single large, protrusible, cauliflower-shaped gonotyl. Seminal vesicle curved, constricted at middle, its base lying slightly anterior to ovary. Testes transversely oval, left testis frequently smaller than right, opposite each other near posterior end of body; right testis 66 to 74μ long by 66 to 110μ wide, left testis 52 to 74μ long by 63 to 110μ wide. Ovary globular to transversely oval, 40 to 84μ long by 66 to 92μ wide, pretesticular, slightly to right of median line; seminal receptacle globular, median, in zone of ovary. Vitellaria lateral, extending from level of posterior margin of acetabulum to posterior end of body. Uterus preovarial, greatly convoluted, extending anteriorly as far as intestinal bifurcation. Eggs 18μ long by 11μ wide.

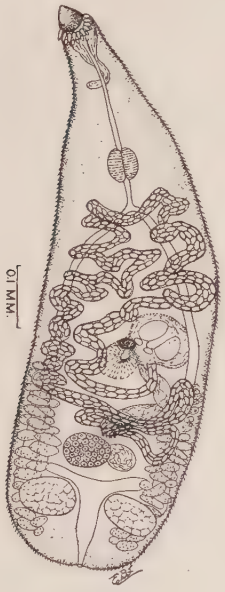

Fig. 11. *Ascocotyle mcintoshi*, ventral view.

Host.—Guara alba (Linn.).

Location.—Small intestine.

Distribution.—United States (Florida).

Specimens.—U.S.N.M. Helm. Coll. No. 42210 (type and paratype) and No. 42211 (paratype).

This trematode differs from all other species of the genus in the length of the intestinal ceca which extend to the level of the testes; in the related forms the ceca never extend posterior to the ovary.

Recently Srivastava (1935, Proc. Acad. Sci., U. P., India, 4: 269-278) described a new species of *Ascocotyle* which differs from the other species of the genus (s. str.) in having the uterus confined to the postacetabular portion of the body. This is taken by him as evidence that *Phagicola* should not be accorded generic rank but should be regarded as a subgenus of *Ascocotyle*. The present writer has on several occasions maintained that *Phagicola* is a valid genus rather than a subgenus and is still of that opinion, although he is willing to concede to any worker the right of personal opinion and has no objection to the use of *Phagicola* as a subgenus if anyone prefers to regard it as such. However, the species comprising the *Ascocotyle-Phagicola* complex fall quite distinctly into 2 categories—one group, *Ascocotyle*, having 2 rows of spines in the oral coronet,

body completely spined and vitellaria extending anterior to the level of the ovary, and the other group, *Phagicola*, having a single row of spines in the oral coronet, the body incompletely spined (spines absent on posterior portion of body) and vitellaria confined to the postovarial region. In view of the fact that in each of these groups there are at least 3 correlated characters the writer regards *Ascocotyle* and *Phagicola* as better established genera than some of the other genera of heterophyids, as well as many genera of other families, the validity of which rests largely upon a single character which in many cases is decidedly variable.

The species belonging to the genus *Ascocotyle* (s. str.) may be separated by the following key:

1. Uterus not entering preacetabular zone.....*intermedius* (Srivastava)
   Uterus entering preacetabular zone..... 2
2. Intestinal ceca extending posteriorly as far as level of testes. *mcintoshi*, n. sp.
   Intestinal ceca not extending posteriorly as far as level of testes..... 3
3. Oral coronet with 72 spines (36 in each row).....*megalocephala* Price
   Oral coronet with 32 to 36 spines (16 to 18 in each row)..... 4
4. Oral coronet with 36 spines.....*filippei* Travassos
   Oral coronet with 32 spines..... 5
5. Uterus extending into posttesticular zone.....*tenuicollis* Price
   Uterus not extending into posttesticular zone..... 6
6. Vitellaria extending from level of genital sinus to slightly anterior to level of testes .....*coleostoma* (Looss)
   Vitellaria extending from level of posterior margin of acetabulum to posterior end of body.....*puertoricensis* Price

Redescriptions of the type species of the trematode genera *Lechriorchis* Stafford and *Zeugorchis* Stafford (Plagiorchiidae). E. W. Price, U. S. Bureau of Animal Industry.

In 1905 (Zool. Anz., 28: 681-694), Stafford proposed the genera *Lechriorchis* and *Zeugorchis* for some trematodes from North American snakes. The descriptions of the types of these genera were not extensive and no illustrations were given. The lack of illustrations of these forms apparently resulted in confusion as to their identity, especially with respect to the genus *Zeugorchis*. Recently the writer located some mounted specimens of the types of these genera in the Helminthological Collection of the United States National Museum, and in this paper are given redescriptions of these specimens for the benefit of those workers who are interested in the flukes of these and related genera.

Lechriorchis primus Stafford, 1905

Description.—Body elliptical (fig. 12, A), 5.5 mm long by 1.4 mm wide; cuticule spiny. Oral sucker subterminal, 510μ long by 476μ wide; acetabulum 680μ long by 782μ wide, separated from oral sucker by a distance of 120μ. Prepharynx short; pharynx 200μ long by 185μ wide; esophagus 170μ long; intestinal ceca slender, partly obscured by uterus. Genital aperture median, immediately posterior to intestinal bifurcation. Cirrus pouch 1 mm long by 340μ wide, its base at level of center of acetabulum, containing numerous prostate cells and slender, somewhat folded seminal vesicle. Testes oval, about 560μ long, slightly oblique to long axis of body, party obscured by ascending limb of uterus. Ovary globular, 170μ in diameter, slightly to right of median line and at level of posterior margin of acetabulum. Vitellaria not clearly distinguishable, apparently extending from level of anterior margin of acetabulum to anterior poles of testes. Uterus consisting of a single loop; descending limb slender and extending to posterior end of body; ascending limb wide, becoming narrowed at level of acetabulum; metraterm about 1/2 as long as

cirrus pouch, with relatively thick walls. Eggs oval, 52 to 55μ long by 26 to 29μ wide.

Specimen.—U.S.N.M. Helm. Coll. No. 6889 (labelled type), collected by J. Stafford from *Eutaenia sirtalis* L. (=*Thamnophis sirtalis*) at Montreal, Quebec.

The genus *Mediorima* Nicoll, as pointed out by Talbot (1934, Tr. Amer. Microsc. Soc., 53: 40-56), is congeneric with *Lechriorchis* Stafford, the type species, *M. propria* (=*L. propria*) differing from *L. primus* as described above in no essential detail other than in the size of the eggs (39μ long by 18 to 20μ wide, according to Nicoll).

Zeugorchis aequatus Stafford, 1905

Description.—Body elliptical (fig. 12, B), 1.9 mm long by 629μ wide; cuticula spiny. Oral sucker subterminal, 255μ in diameter; acetabulum 187μ in diameter, 422μ posterior to oral sucker. Prepharynx very short; pharynx 136μ long by 100μ wide; esophagus 170μ long; intestinal ceca relatively slender, extending to near level of anterior poles of testes. Genital aperture median, immediately posterior to intestinal bifurcation. Cirrus pouch 425μ long by 120μ wide, slightly oblique to long axis of body and with its base posterior to acetabulum. Testes oval, unequal, side by side near posterior end of body; right testis 270μ long by 170μ wide, left testis 200μ long by 170μ wide. Ovary globular, 170μ in diameter, median, immediately posterior to acetabulum. Vitellaria largely dorsal, forming wide band across body and extending from level of genital aperture to within short distance of tips of ceca. Uterus consisting of a single loop, descending limb slender and somewhat convoluted, extending to posterior end of body; ascending limb relatively wide; metraterm relatively short and muscular, to left of cirrus pouch. Eggs oval, 44μ long by 22μ wide.

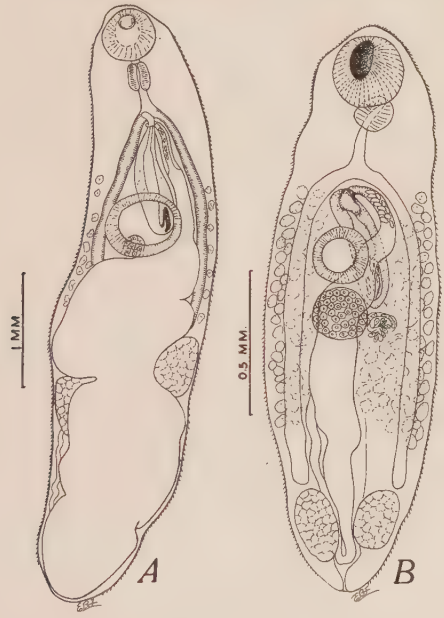

FIG. 12. A—*Lechriorchis primus*, ventral view. B—*Zeugorchis aequatus*, ventral view.

Specimen.—U.S.N.M. Helm. Coll. No. 6890 (labelled type), collected by J. Stafford from *Eutaenia sirtalis* L. (= *Thamnophis sirtalis*) at Montreal, Quebec.

A comparison of this species with specimens of *Caudorchis eurinus* Talbot shows that the two forms are congeneric, and *Caudorchis* Talbot must fall as a synonym of *Zeugorchis* Stafford. *Z. eurinus* (Talbot) appears to be distinct from *Z. aequatus* (Stafford) in having a shorter cirrus pouch, smaller ovary and less extensive vitellaria. The species included by Talbot (1934, loc. cit.) in the genus *Zeugorchis*, viz., *Z. bosci* (Cobbold), *Z. ancistrodontis* (MacCallum), *Z. syntometra* Sumwalt and *Z. megametricus* Talbot are not congeneric with *Z. aequatus* Stafford and cannot be retained in that genus. *Distoma bosci* Cobbold, which Stafford regarded as belonging to the genus *Zeugorchis*, cannot well be included at present in *Zeugorchis* or any of the related genera; the median genital aperture and the extent of the intestinal ceca seem to relate it more closely to *Dasymetra* Nicoll than to any of the other genera.

For the remaining species included by Talbot in the genus *Zeugorchis*, a new genus, *Pseudorenifer*, was tentatively proposed by the writer (Price, 1935, J. Parasitol., 21:437), the diagnosis being that for Talbot's *Zeugorchis;* P. *megametricus* (Talbot) was selected as type, with *P. ancistrodontis* (MacCallum) and *P. syntometra* (Sumwalt) as included species. *Zeugorchis natricis* Holl and Allison (1935, J. Parasitol., 21: 197-199) also appears to belong in *Pseudorenifer*, the species becoming *P. natricis* (Holl and Allison), n. comb.

A new trematode, *Laterotrema americana*, n. sp. (Stomylotrematidae), from song birds. Allen McIntosh, U S. Bureau of Animal Industry.

Two specimens of a trematode, previously reported as *Laterotrema* species (J. Parasitol. 21 (6):431), were found in 2 birds, a red-eyed vireo (*Vireo olivaceus*) and a Maryland yellow-throat (*Geothlypis trichas*), collected at the base of the Washington Monument during the 1935 autumnal migration. This parasite may have been accidental in these 2 birds as it was found in only one of 71 red-eyed vireos and in only one of 27 Maryland yellow-throats examined. The specimen (fig. 13, A) from the vireo, collected September 28, is larger than the specimen (fig. 13, B) from the warbler collected September 6.

The genus *Laterotrema* Semenov, 1928 (Centbl. Bakt. [Etc.], Abt. II. 73: 96-104) was proposed for *Distomum vexans* Braun, 1901. This is the first report of a member of this genus from North America. *Laterotrema vexans* (Braun, 1901) Semenov, 1928, is known from several species of European birds. Both Braun's and Semenov's descriptions and figures of *L. vexans* appear to differ sufficiently from the American representative of the genus to justify recognizing a second species for which the name *Laterotrema americana*, n. sp. is proposed.

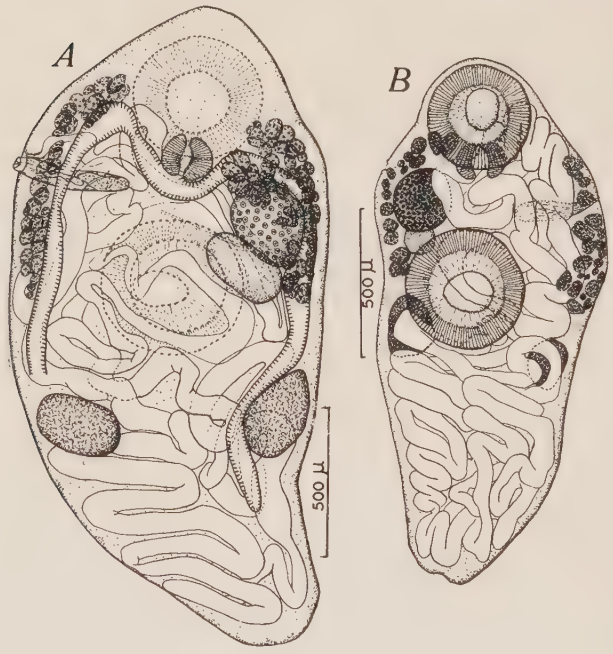

Fig. 13. *Laterotrema americana*, n. sp.
A—From red-eyed vireo, dorsal aspect. B—From Maryland yellow-throat, ventral aspect.

Laterotrema americana, n. sp.

Description.—Body linguiform, 1.7 to 2.1 mm long by 750μ to 1 mm wide; cuticula covered with spines. Oral sucker subterminal, 330 to 390μ in diameter, acetabulum slightly preequatorial, 370 to 450μ in diameter. Pharynx spherical, 160μ in diameter; esophagus extremely short or absent; intestinal crura, difficult to follow, apparently ending posterior to testes; in living speci-

mens the ceca apparently filled with a greenish fluorescent substance. Testes oval, somewhat smaller than ovary, lateral on opposite sides of body and slightly postequatorial, near posterior margin of acetabular zone. Seminal vesicle, prostate and cirrus enclosed in a cirrus pouch, 370μ long by 70μ wide, ventral to gut on left margin of body, opposite ovary. Genital pore marginal. Ovary approximately spherical, from 200 to 300μ in diameter; seminal receptacle well developed, posterior to ovary; Laurer's canal not observed. Vitellaria composed of several comparatively large follicles arranged along each lateral margin of body from zone of oral sucker to middle of acetabular zone. Uterus with descending and ascending coils filling most of body space posterior to oral sucker and terminating in a short well-developed metraterm anterior to cirrus sac. Eggs lemon-yellow, 25μ by 14μ, numerous.

Habitat.—Bursa Fabricii of *Vireo olivaceus* (type host) and *Geothlypis trichas.*

Locality.—Washington, D. C.

Type.—U.S.N.M. Helm. Coll. No. 42212; paratype No. 42213.

The new species may be distinguished from *Laterotrema vexans* (Braun) in having the ovary as large as, or larger than, the testes and the vitellaria arranged in 2 distinct lateral groups not united anteriorly.

A new trematode, *Gyrabascus echinus*, n. sp., from the yellow-breasted chat.

ALLEN MCINTOSH, U. S. Bureau of Animal Industry.

On September 7, 1935, 14 specimens of a trematode were found in one of 3 yellow-breasted chats, *Icteria virens,* that had died the previous night from striking the Washington Monument. On opening the body cavity of the parasitized bird, several dark cyst-like projections on the small intestine were observed. From each of these cysts 2 flukes were obtained. On later dates, from September 7 to October 4, through the cooperation of Mr. Robert Overing, of Landover, Md., 5 additional chats were examined and found to be negative for this parasite. None of 30 other species of birds, comprising approximately 180 individuals, examined during the 1935 autumnal migration, harbored this parasite.

In a preliminary paper on the "Parasitic fauna of birds found dead on the Washington Monument Ground during the 1935 autumnal migration" (1935, J. Parasitol. 21 (6): 431), the flukes described were referred to as "troglotrematids." However, after reviewing the literature on the Troglotrematidae, it was found that none of the genera assigned to that family had sufficient latitude to permit the inclusion of this species. The type of the genus *Gyrabascus* Macy, 1935, shows structural similarity to the new species described here. On account of this similarity the new species is tentatively assigned to *Gyrabascus,* although the apparent relationship to *G. brevigastrus* Macy, 1935, may prove to be a convergence of form rather than a phylogenetic relationship. Macy assigned his new genus to the family Lecithodendriidae, but on account of the genital pore being postacetabular, and the sinuous seminal vesicle lying free in the body parenchyma, not surrounded by a definite prostate mass, he proposed a new subfamily, Gyrabascinae, for the genus *Gyrabascus* and a related genus, *Ophiosacculus* Macy, 1935, both monotypic genera from the small intestine of bats. No spines were observed by Macy on the cuticle of *Gyrabascus brevigastrus,* nor was there any mention as to specimens having been observed encysted in pairs, a peculiarity which is usually associated with members of the family Troglotrematidae.

Gyrabascus echinus, n. sp.

Description.—Body pyriform, with ventral side somewhat flattened, 1 to 1.15 mm long by 640 to 925μ wide, and 700μ thick in sectioned specimen; cuticula covered with spines. Suckers approximately equal, 135μ in diameter, oral sucker slightly subterminal, ventral sucker equatorial. Pharynx spherical, 70μ in diameter; esophagus long, the crura forking a short distance anterior to acetabulum, ceca broad, sacculate, only slightly longer than esophagus, filled with dark pigmented substance, apparently partially digested blood of host, and terminating slightly posterior to zone of acetabulum. Testes somewhat oval, dorsal, one on each side of median line in same zone; left testis 200μ long by 125μ wide, right testis 170μ long by 135μ wide. Vasa efferentia arising from mesal margin of testes near anterior pole, uniting to form a short vas deferens leading to a small, slightly sinuous seminal vesicle; ejaculatory duct leading from seminal vesicle to genital pore; no prostate, cirrus or cirrus sac observed. Genital pore situated medioventral and posterior to acetabulum, near posterior border of testicular zone. Ovary consisting of 3 to 4 lobes, diameter of largest lobe about equal to that of acetabulum, dorsal, and slightly to right of acetabulum. Oviduct arising from posterior extremity of ovary; seminal receptacle and Laurer's canal present. Vitellaria consisting of a broad band of follicles surrounding esophagus. Uterus consisting mostly of transverse coils, confined to posterior half of body, filling all of this area with the exception of a central area occupied by the large excretory bladder. In viewing specimens from ventral side, 2 transverse coils of uterus, filled with brownish mature eggs, stand out conspicuously; the most anterior of these coils terminates in a short muscular metraterm. Eggs 27μ by 20μ, ending basally in a short spine-like process.

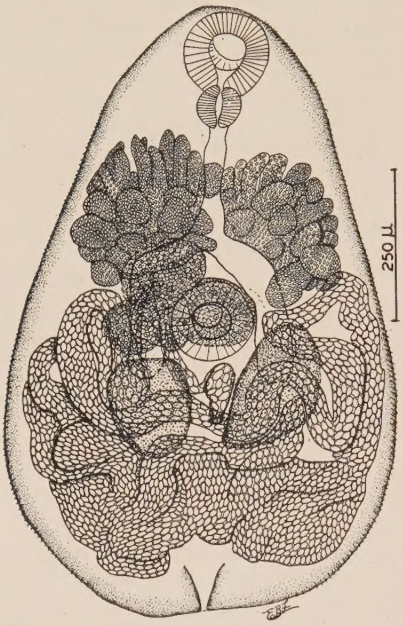

FIG. 14. *Gyrabascus echinus*, n. sp., ventral aspect.

Habitat.—*Icteria virens*, encysted in pairs in wall of small intestine, and also (smaller specimens) free in lumen.

Locality.—Washington, D. C.

Type.—U.S.N.M. Helm. Coll. No. 42209; paratype No. 42210.

The presence of a lobed ovary and longer ceca in the new species will aid in separating it from *Gyrabascus brevigastrus* Macy, 1935.

The identity and variation of *Pediculus humanus americanus*. HENRY E. EWING, U. S. Bureau of Entomology and Plant Quarantine.

In a former note presented to this society (Proc. Helm. Soc. Wash. 1:21) the writer reported the finding of a louse questionably identified as *Pediculus humanus americanus* Ewing, heavily infesting 2 monkeys at the National Zoological Park that had come from the Upper Amazon. These monkeys were *Pithecia monachus* and *Cacajao rubicundus*. I would like to report here further observations on these lice, as well as on some lice taken from a living American Indian.

Ferris (Stanford Univ. Pub., Biol. Sci. 2:58) in his beautifully illustrated but highly critical paper dealing with *Pediculus* does not recognize this variety or any of the other varieties of *Pediculus humanus*. This is not a new viewpoint. It is a conclusion reached some years ago by Nuttall, who by the way, furnished Professor Ferris with his extensive study collection of pediculi. And it is to him that Professor Ferris appropriately dedicates his work.

It is important to note that while Ferris examined the type of *americanus, which was taken from a prehistoric Indian mummy*, he chose to make his illustrations and comparisons from lice taken from living Indians. This fact furnishes the starting point for my present observations. The *americanus* specimens he describes are all but identical with those that I have taken from Brazilian monkeys and have received from a living Indian. They have been found to differ in the adult state from the *americanus* types in having small but very definite lateral lobes to the paratergal plates IV and V. This condition is at once recognized as an approach to the common types of lice found on spider monkeys, and raises certain questions: Did Ferris really figure my *americanus*, or did he figure a variety that now infests certain American monkeys and also living American Indians? Could it be that the head louse of prehistoric American Indians, in which there is a bare suggestion of lateral lobes to the paratergal plates, has so changed in its morphological characters as to be practically identical with lice now able to thrive on certain American monkeys. Can it be that this production of, or tendency toward production of lateral lobes on the paratergal plates in *Pediculus*—which is correlated with geographical distribution—is to be explained by orthogenesis? If so we might assume that in the "Mongolian head louse" (if the Mongolians had a head louse) there developed a tendency for certain louse individuals to show slight lobing of certain paratergal plates. This tendency may have been transmitted to their lineal descendents, the head lice of prehistoric American Indians. These lice on the prehistoric Indians may have spread later to American monkeys. On the monkeys the orthogenetic tendency to produce lobes continued until now we have a setup of several species or varieties on these monkeys. Personally the writer is inclined to favor the idea of orthogenesis causing the production of the lateral lobes on the paratergal plates. The production of these lobes certainly appears correlated with the spread of the head louse eastward from Asia; in particular the lobes become well developed on certain American monkeys.

MINUTES

One hundred seventy-third and one hundred seventy-fourth meetings

The 173rd meeting was held on October 19, 1935. Officers were elected: President, Dr. G. F. Otto; Vice President, Mr. A. McIntosh; Recording Secretary, Dr. W. H. Krull; Corresponding Secretary-Treasurer, Miss Edna M. Buhrer. Subsequent to a discussion of business matters, involving the Ransom Memorial Fund, funds available for refunds to individual contributors of manuscripts and attendance of meetings, papers were presented by Drs. Christie, Foster and Justin Andrews.

The 174th meeting was held on November 16, 1935. Papers or notes were presented by Drs. Ewing, Chitwood, Price, Bartsch and Christie. Miss Juliette M. Oliveira, of the Pineapple Producers' Experiment Station in Hawaii, discussed the men and their work in Dr. Leiper's laboratory.

WENDELL H. KRULL, *Recording Secretary.*

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